The Electrical Industry's Weekly Magazine

January 9, 1956

Electrical World

Price 35 Cents

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Triple Threat

LIVE BETTER... OPERATION DEMONSTRATE WHERE YOU ARE

ACTION

American Council To Improve Our Neighborhoods

OPERATION '56...the year to FIX HOME IMPROVEMENT

to Slum Areas

. . . Page 75

NEW IN THIS ISSUE—A 4-Page Insert Introducing:
"Electrical Business Outlook" and "Your Business" . . . . . Page 19

DUKE POWER Company turbines at Riverbend Steam Station, Mt. Holly, North Carolina. All seven turbines in this plant, with a capacity of 631,000 kw., are lubricated with *Texaco Regal Oil R&O*. In addition, four turbines, totaling 210,000 kw. capacity, at Duke's Cliffside Steam Station, Cliffside, North Carolina, and six turbines, totaling 440,000 kw. capacity, at Buck Steam Station, Spencer, North Carolina, are also 100% Texaco-lubricated.

NO SLUDGE, NO RUST, NO FOAM IN DUKE TURBINES...

THE REASON WHY: Seventeen of Duke Power Company's steam turbines – having a total capacity of more than 1,281,000 kw. – are lubricated exclusively with world-famous *Texaco Regal Oil*—the oil that, throughout its extra long service life, affords extra protection against sludge, rust and foam, assures clean turbine systems, normal bearing temperatures, instantaneous governor response.

Texaco Regal Oil R&O is made from carefully selected choice base stocks. These are specially refined, then further improved by effective additives and special processing.

There is a complete line of *Texaco Regal Oils R&O* to meet the stringent requirements of all leading turbine builders, for all types and sizes of turbines.

Let a Texaco Lubrication Engineer help you achieve greater power plant efficiency. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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TEXACO

TEXACO Regal Oils R&O

FOR ALL TURBINES

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Electrical World

Published for 81 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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MANAGEMENT

TRIPLE THREAT TO SLUM AREAS 75
WHY STEVENS COUNTY TURNED OUT PUD 50
Electrical Business Outlook 19
Statistics 20
Your Business 21
Finance and Regulation ... 22, 151

DISTRIBUTION

SHIELDING CUTS OUTAGE TIME 47% ..... M. G. West 63
RIGHT CONDUCTOR SAVES MONEY ..... H. M. Bankus 70
SIMPLE TOOL DRILLS PILOT HOLES ..... C. E. Osborne, Jr 96
GUIDE FOR MAKING DEAD ENDS IN ACSR 98

INDUSTRIAL

MORE POWER BOOSTS PAPER OUTPUT ..... F. O. Chency 66
WIRING KEYNOTES LAUNDRY'S MODERNIZATION .. Leon Albertson 108
INTERLOCKED CABLE FEEDS PARCHMENT CO ..... Harley McDaniel 110

GENERATION

CANAL GATES ARE CONTROLLED AUTOMATICALLY .. E. L. Hamilton 87
INSIDE CRANE CUTS BUILDING TIME ..... E. W. Robinson 102
HINGED PADDLE STOPS BELT ..... J. R. Martin 107

TRANSMISSION

POLISHES ABRASIONS ON 345-KV CONDUCTOR 92

SYSTEM ENGINEERING

CIRCUIT PROTECTS TELEMETER INSTRUMENT ..... D. T. Jones 107

METERING

DOGS BRIBED WITH CANDY DON'T BITE 107

SALES

NEW INDIANA SCHOOL HEATS ELECTRICALLY 112

EDITORIAL AND COMMENTARY

Editorials 51
Book Reviews 142
Technical Notes 150
Readers Forum 149
Washington Comment 150

EQUIPMENT NEWS

New Equipment 116
Catalogs and Bulletins 126

INDUSTRY NEWS

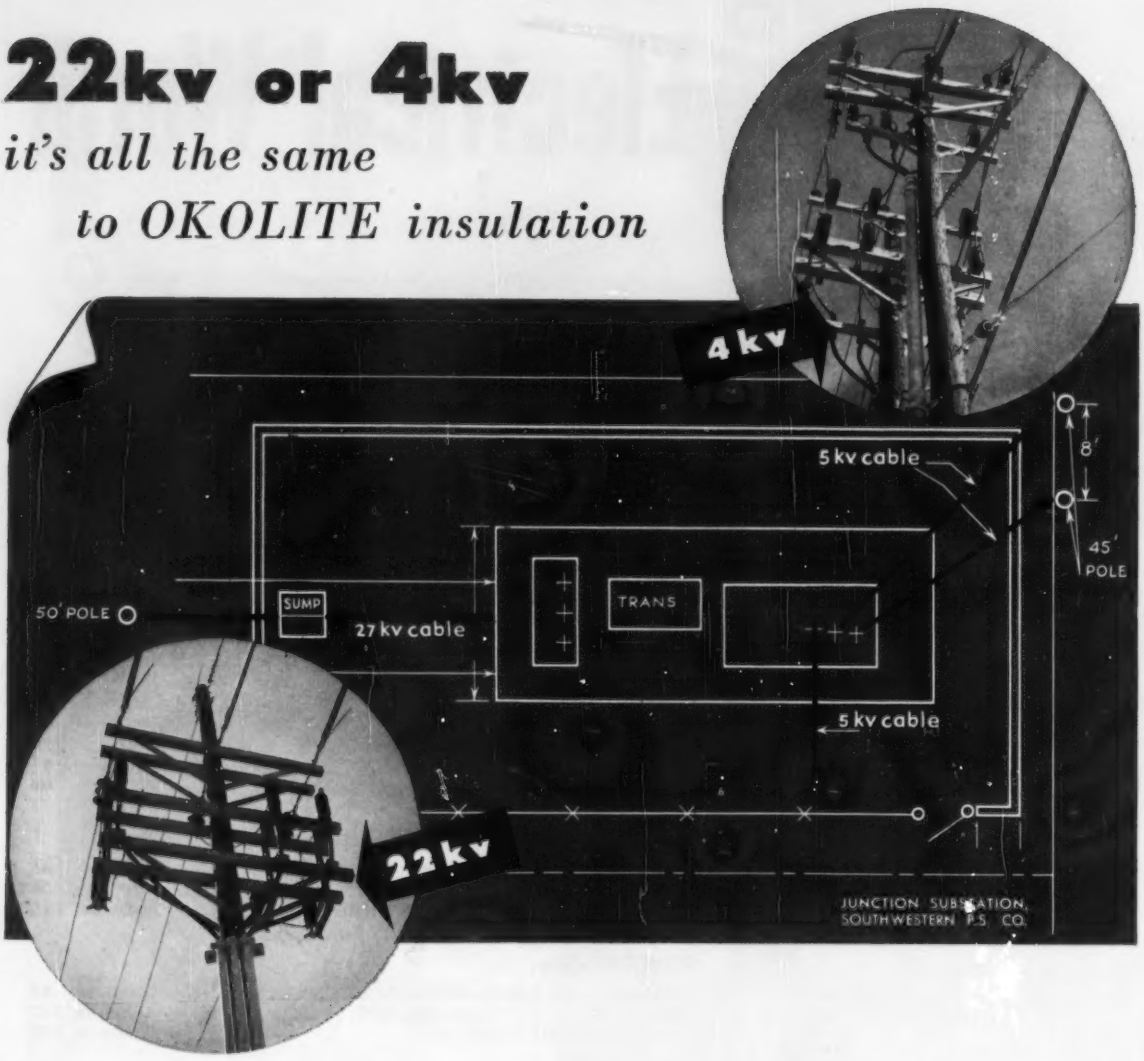
Electrical Week 52
Current Events .. 54, 144, 145, 148
Manufacturers and Markets ... 130
News About People 136
Sales Assignments 140
Meetings Calendar 140

INDEX OF ADVERTISERS

..... 153

22kv or 4kv

it's all the same to OKOLITE insulation



High voltage or low voltage—Okolite rubber insulation provides maximum dependability and utmost safety. Here at the Junction Substation of the Southwestern Public Service Company in Lubbock, Texas, both the 4kv and 22kv circuit risers are Okolite-insulated, Okoprene-sheathed cables.

Okolite-Okoprene cables have an outstanding reputation for reliability in circuits up to 35,000 volts. Okolite-Okoprene is easy to handle and cuts installation costs; the problem of oil migration is nonexistent and splices and terminations require less time and labor.

Write today for Okonite's complete handbook on rubber-insulated, high-voltage cables, Bulletin EW-1075. It contains complete engineering and installation information for circuits up to 35,000 volts. The Okonite Company, Passaic, N. J.

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And should a difficult problem concerning pole line construction arise — call on a Graybar Outside Construction Specialist to work with your engineers. He'll be glad to help you find the best way to a fast, economical solution. Complete information is yours for the asking — just call the Graybar Representative nearest you. 401-90

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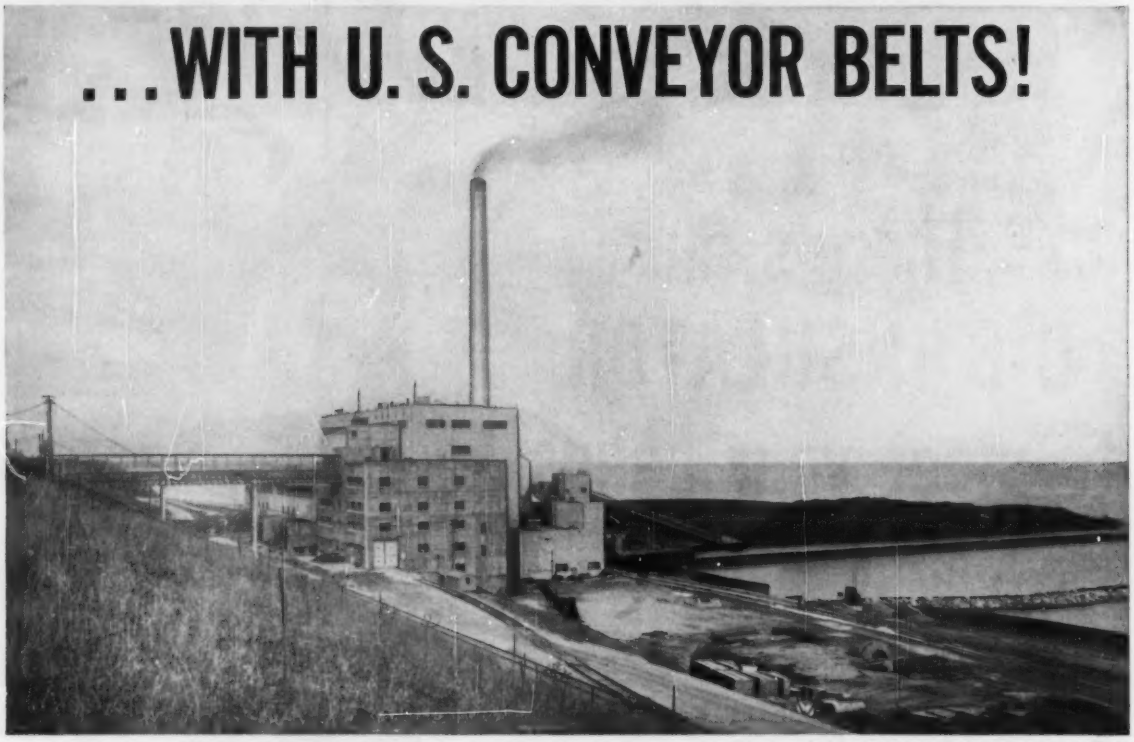


Partial view of new Oak Creek plant of Wisconsin Electric Power Co.

"'U. S.' gives us best coal-moving efficiency possible," says the cost engineer of Wisconsin Electric Power Co.

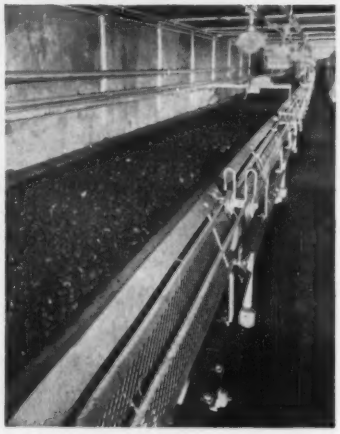
The immense new Oak Creek generating plant of Wisconsin Electric Power Co. is the largest and most modern in the entire state. Total planned capacity: 500,000 kilowatts... to feed the ever-growing demands of Wisconsin homes and industries.

It takes well over 4100 tons of coal per day to produce such a tremendous amount of power. And to move this amount of coal, Wisconsin Electric has installed United States Rubber Conveyor Belts. Says Mr. H. Jorgenson, the plant's cost engineer, "the U. S. belts help give us the finest coal-moving efficiency possible."

"U. S." products are not newcomers with Wisconsin Electric. "U. S." belts have been working there for more than twenty years.

"PULVERIZED COAL HAS TO BE HANDLED LIKE DYNAMITE," says Mr. Jorgenson. That's why throughout the plant you will find fire protection equipment of the most advanced type, and U. S. Peerless® is the brand of water hose hooked up to the system.

"THE ENTIRE GENERATING SYSTEM IS ALIVE WITH CONSTANT EXPANSION AND CONTRACTION, BECAUSE OF MANY HEAT CHANGES AND PRESSURES." That's why Wisconsin Electric cushions its power plant piping systems with U. S. Expansion Joints—to counteract the destructive effects of expansion, contraction and misalignment. Utility companies throughout the country not only depend on the *excellence* of "U. S." products but on the "constant vigilance" of "U. S." engineers in periodically checking up on "U. S." product performance, plus giving engineering and technical help whenever needed. Get in touch with any of the 27 "U. S." District Sales Offices, or write to us at Rockefeller Center, New York 20, N. Y.



"U. S." 48-inch conveyor belt.

US RUBBER

Mechanical Goods Division

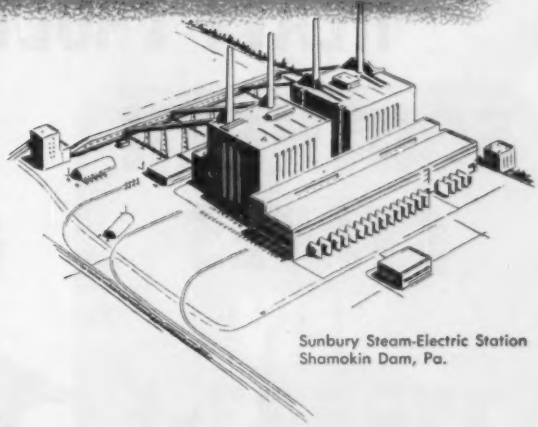
United States Rubber

PENNSYLVANIA POWER & LIGHT COMPANY

. . . an *exclusive* user of Grinnell prefabricated piping for 16 years

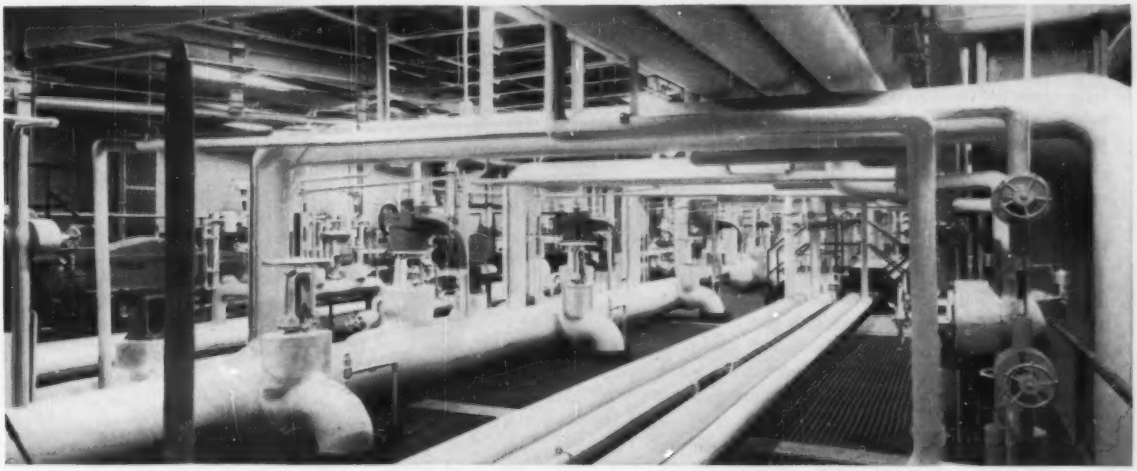
Since 1940, Pennsylvania Power & Light Company has awarded *all* its prefabricated piping work to Grinnell. Some idea of the extent of this confidence in the competence and skill of Grinnell piping specialists can be drawn from the fact that during this 16-year period there were 8 new units installed — with a total capability of close to 800,000 kw's.

Among other companies in the power field which have indicated a marked preference in the past for Grinnell Piping Products are Duke Power, a Grinnell Prefabricated Piping user for 44 years; New England Electric System, a 6-year, 6-time repeat customer; and Carolina Power & Light, a 7-year, 7-time Grinnell repeat customer.



Sunbury Steam-Electric Station
Shamokin Dam, Pa.

Where some of the 4,500 individual fabricated piping assemblies made by Grinnell were installed at the Sunbury Station.



The big jobs in power piping go to Grinnell because Grinnell's shop facilities offer these practical advantages . . . superior quality of finished product; faster "on the job" assembly; lower final cost. Assign *your* next piping job to Grinnell.

Work done by Grinnell for Pennsylvania Power & Light Company

1940-41	Cedar Station, Unit #6
1941-42	Hauto Station, Unit #6
1949	Sunbury Station, Units 1 & 2
1950	Sunbury Station, Unit #3
1953	Sunbury Station, Unit #4
1954	Martins Creek Sta., Unit #1
(Scheduled Completion)	
1956	Martins Creek Sta., Unit #2

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WHENEVER PIPING IS INVOLVED

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pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

THE CUTOUT THAT TAKES HEAVY FAULTS IN STRIDE!

SOUTHERN STATES NEW TYPE 33-F

Engineers know that when a heavy fault hits a cutout, powerful shock forces are created. A large volume of gas is generated instantly, developing extremely high pressure inside the tube. For an instant the life of the cutout depends on its ability to absorb and dissipate the concentrated energy.

The new Southern States Type 33-F is engineered to take this critical stress in stride!

In less than half a cycle a tremendous volume of gas is expelled from *both ends* of the 33-F tube. No components project into the vent zone to interfere with the rapid discharge of gases. There are no "pockets" to trap and deflect any of the high velocity gases. *This prevents ricochet flashover.*

Every part and parcel of the 33-F is designed to withstand repeated jolts without damage—assuring positive circuit protection and a cutout ready for quick re-fusing instead of replacement.

For a simple, rugged cutout that you can depend on under ever increasing system capacities, choose the Southern States Type 33-F.

NOTE TO USERS OF SS 33-D and 33-DH CUTOUTS

Either of these types on your system can be converted for higher short circuit duty by simply replacing the fuse holder, as long as the continuous rating of the installed cutout is not exceeded.

CHECK THESE INTERRUPTING RATINGS

TYPE 33-F		
KV	CONT. AMPS.	RMS AMPS. INT. CAPACITY
5	100	8,000
7.5	100	8,000
15	100	6,000
25	100	3,000

TYPE 33-FH		
KV	CONT. AMPS.	RMS AMPS. INT. CAPACITY
5	100	10,000
5	200	10,000
7.5	100	10,000
7.5	200	10,000
15	100	8,000
15	200	8,000
25	100	4,000

INTERCHANGEABLE FUSE HOLDERS

The fuse holders are interchangeable between Types 33-F and 33-FH.

SS®

SOUTHERN STATES EQUIPMENT CORP.

HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

storage batteries . . . dry wells and **BATTERY CHARGERS**

There's an old proverb..."you never miss the water till the well runs dry." And it's that way in power substations, railroad signal systems, telephone central offices, and alarm installations...you never miss a standby storage battery until it fails.

To make sure that these vital standby power sources *do not* fail, more and more industries and utilities are finding that INET-Palmer *Regulated* Battery Chargers are the best form of insurance—and one of the least expensive. Completely unattended, they guard batteries against sulfation and discharge...make sure *24 hours a day* that standby power, on those rare occasions when it's needed, is always ready.

6 reasons why **INET-PALMER** *regulated chargers are your* **BEST BUY**

COMPLETELY AUTOMATIC...operates unattended

DEPENDABLE...no moving parts or vacuum tubes

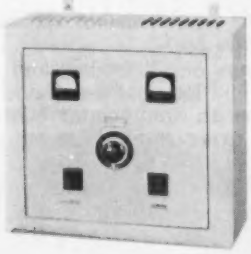
STABLE...less than ±1% variation from no-load to full-load despite ±10% *simultaneous* input variation

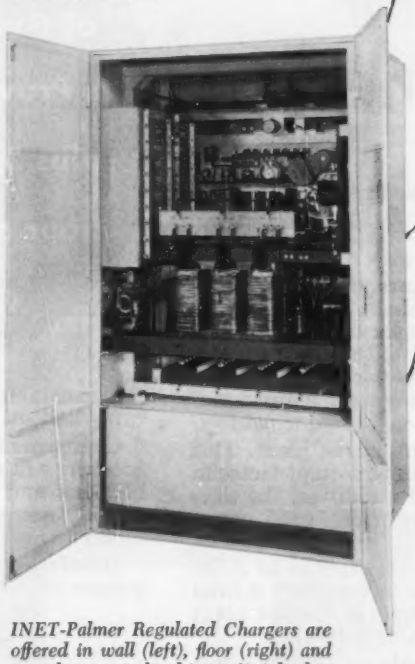
EASY INSTALLATION...floor, wall, or panel models

WIDE RATING RANGE...3 to 60 cells in ratings to 50 KW

LOW OPERATING COST...nothing to wear out, nothing to maintain

Send today for Bulletin T-1100, containing complete specifications.





INET-Palmer Regulated Chargers are offered in wall (left), floor (right) and panel-mounted cabinets finished to customer specifications.

LEACH CORPORATION | INET-PALMER DIVISION

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LEACH RELAY DIVISION

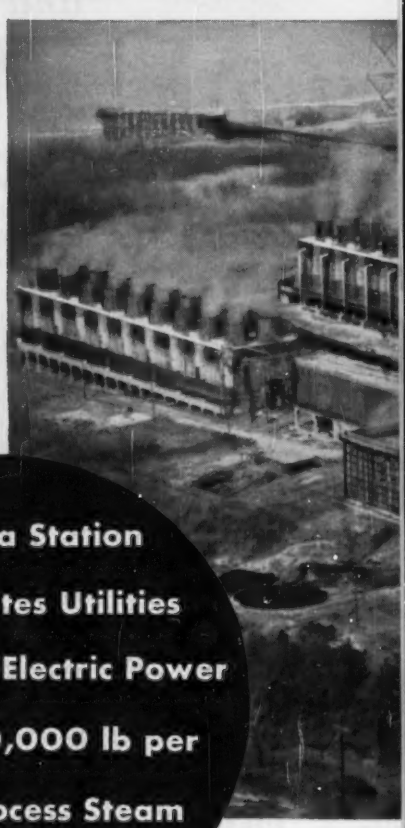
INET-PALMER DIVISION

DISTRICT OFFICES AND REPRESENTATIVES IN PRINCIPAL CITIES OF U. S. AND CANADA

Utility provides both steam

This Fact Makes It *doubly important*

That Switchgear Provide Uninterrupted Power for Auxiliaries



Louisiana Station of Gulf States Utilities Co. Provides Electric Power plus 3,000,000 lb per hour of Process Steam for Industry

TWO lineups of Allis-Chalmers station auxiliary switchgear are used in this plant. Engineered by Stone and Webster, it is one of the largest steam plants in the United States. Since much of the process steam is supplied to refineries, the load factor is high and the need for continuity of service of the station auxiliaries is especially critical. Gas is used as the principal fuel.

There are 12 turbine-generators in the plant. This division of the load is, of course, an important factor in continuity of electrical service. In addition, the electrical schemes used assure an uninterrupted power source for auxiliaries.

There are 13 units in one of the lineups of Allis-Chalmers switchgear and 28 units in the other. A brief description of the new 28-unit lineup in the new plant extension will illustrate the planning employed.

The 28 switchgear units are made up into three bus sections, with each section controlling auxiliaries for a separate boiler.

Under normal operating conditions each bus section is energized by its respective transformer. Tie breakers between the sections are open.

But in the event of trouble any two of the three transformers can feed all three bus sections.

On each bus section there are: one boiler feed pump, two forced draft fans, and two induced draft fans. In addition, there is a fourth boiler feed pump on one bus section which can take the place of any of the other three boiler feed pumps. In the event of failure of either one of the two forced draft or induced draft fans, the remaining fans would enable the boiler to carry half its normal load.

Overcurrent relays on all feeders and bus tie breakers will trip and lock out associated circuit breakers and close an annunciator contact for alarm. Long time overcurrent relays are used on motor feeders.

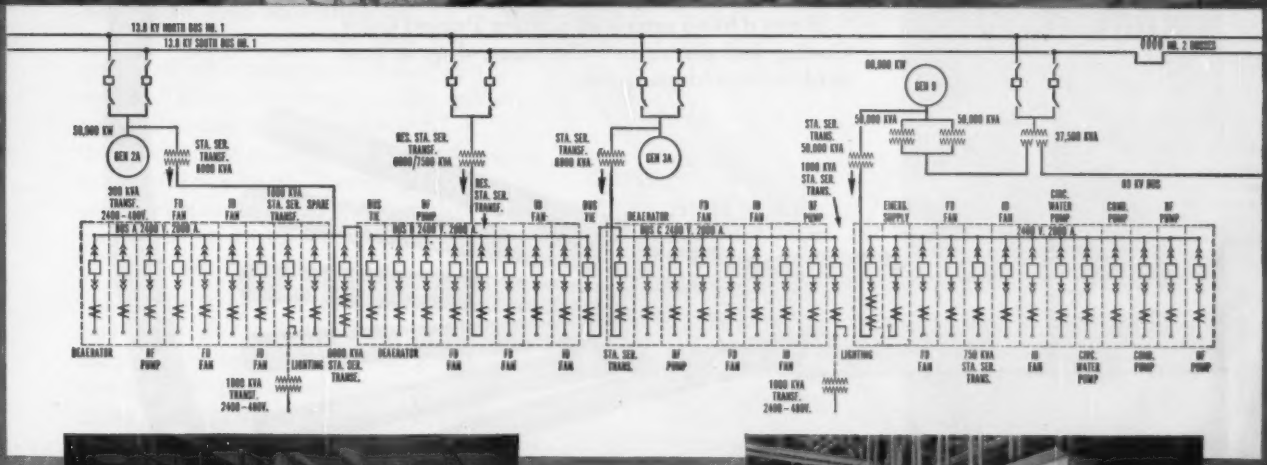
Interlocking in switchgear assures proper sequence of operation of auxiliaries.

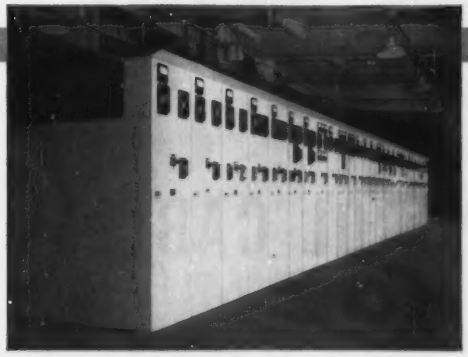
★ ★ ★

Allis-Chalmers engineers worked in close cooperation with both Stone and Webster and Gulf States Utilities Company engineers. This is one of many auxiliary lineups built by Allis-Chalmers. For information about Allis-Chalmers switchgear, call your nearby A-C office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4791

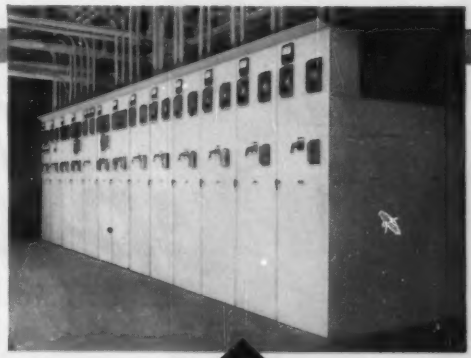
ALLIS-

and electricity for refineries





Special drip-proof design was furnished for both lineups of Allis-Chalmers Metal-Clad Switchgear.



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...in any light

...without twisting

...no matter how dirty

Red conductors in Simplex Control Cables always read red. That's because they're positively identified by white printing on solid black background. They won't change color under different lights the way conductors with colored neoprene coverings do.

Simplex Control Cable conductors don't have to be twisted for identification because color coding is printed on both sides of every conductor at 2½-inch intervals.

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If you'd like a sample of Simplex Printed Color Coding and descriptive literature, drop a post card to the address below.

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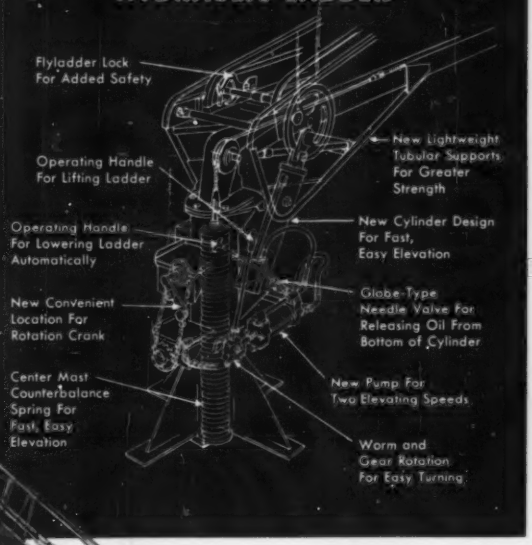
with PRINTED COLOR CODING

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Massachusetts

NEW 2500 SERIES MANUALLY-OPERATED HYDRAULIC LADDER


Flyladder Lock For Added Safety
Operating Handle For Lifting Ladder
Operating Handle For Lowering Ladder Automatically
New Convenient Location For Rotation Crank
Center Mast Counterbalance Spring For Fast, Easy Elevation
New Lightweight Tubular Supports For Greater Strength
New Cylinder Design For Fast, Easy Elevation
Globe-Type Needle Valve For Releasing Oil From Bottom of Cylinder
New Pump For Two Elevating Speeds
Worm and Gear Rotation For Easy Turning

NEW WAY TO GET UP IN THE WORLD

The Holan 2500 Manually-operated Hydraulic Ladder does things no other mechanical ladder can do. With a low-pressure hydraulic system and center mast counterbalancing, the 2500 raises and lowers fast and easy—in a matter of seconds. Elevating locations are infinite; and the angle of elevation can be changed with ladder fully extended . . . safely and without effort.

Other new features of this newest Holan work-simplifier include tubular ladder supports for lighter weight and greater strength; rotation crank located at rear for easier turning, better view and maximum clearance between ladder and body side; and an optional duo-level platform that assures level footing even at lowest angles.

Write for information about the latest addition to industry's biggest and most versatile aerial ladder family.

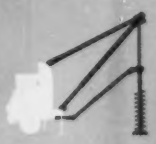
Holan 2500 Manually-operated Hydraulic Ladder with new duo-level platform. Available for 24′, 28′ and 32′ platform-to-ground heights.

Line construction bodies for light to heavy-duty. Crew compartments optional. Efficient tool compartments and drawers.

Service bodies for chassis up to 1½ ton. Lengths, 72″, 75″, 84″, 90″, and 102″.

Power derricks designed for front or rear mounting. Capacities to 12,000 lbs. Handle poles to 75 feet.

Ladders to 40′ with all phases completely hydraulic. Pump actuated by P.T.O. or separate engine drive with electric starter. Also, expertly-engineered mechanical ladders to 32′.



Portable hydraulic and mechanical earth borers. Augers for 8″ to 20″ diameters, depth to 8′.

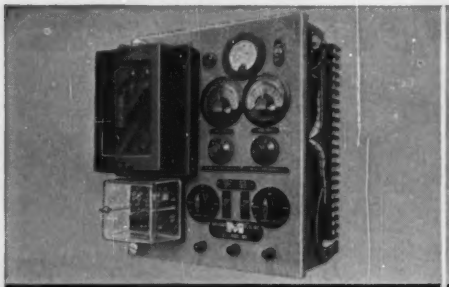
Hydraulic towers from 17′ to 30′ with rotary, stationary, or transverse platforms. Exclusive box-girder telescoping mast.

J.H. HOLAN CORPORATION

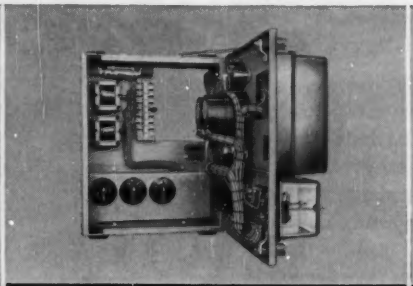
4100 WEST 150TH STREET
CLEVELAND 11, OHIO

OTHER PLANTS:
HOLAN Thrift Line CORP., Griffin, Georgia • J. H. HOLAN CORP., Phoenix Div., Arizona
BRANTFORD-HOLAN LIMITED, Brantford, Ontario

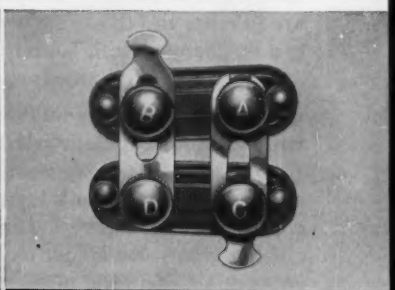
THE NAME THAT MEANS WORK SIMPLIFICATION



MOLONEY AUTOMATIC CONTROL SYSTEM—controls a load tap change by (1) sensing and evaluating the magnitude and direction of the voltage deviation, (2) by delaying the signal until the merit of the deviation is determined, and (3) initiates the switch mechanism through a single tap change or sufficient tap changes to correct the original voltage deviation.



INTERIOR OF AUTOMATIC CONTROL EQUIPMENT PANEL—permits easy access to all control equipment and affords utmost accessibility to all wiring without removing equipment. Access to the interior of the control panel is gained by two quick operating thumbscrews, permitting the hinged front panel to swing out of the way.



REVERSE REACTANCE—requires reversing only the reactance element of the line drop compensator. Terminal blocks for reverse reactance are provided in all control panels as standard equipment.

MOLONEY

Power Transformers • Distribution Transformers • Load Tap Changing Transformers

Unit Substation Transformers • Network Transformers • Series Street Lighting Transformers • Subway

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT

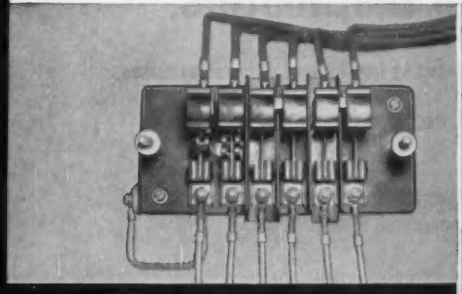
Looking for Buried Treasure?

Control equipment can be buried treasure . . . because even the most valuable, most accurate control equipment is worthless unless it's readily accessible.

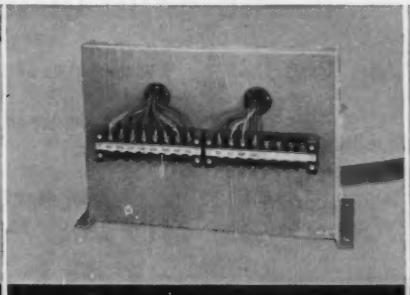
That's why Moloney engineers skillfully designed and located Moloney LTC Transformer controls within one centralized, easily accessible unit. Inspections and adjustments of voltage regulation is accomplished quickly and efficiently.

Moloney LTC Transformer control equipment is flexible, too, because it's easily adapted to parallel operation of two or more transformers.

Specify Moloney LTC Transformers . . . Get Dependability at its Best. 14E98-4B



CROSS CURRENT—requires interconnecting the current transformers of two units to the line drop compensators of the two units. Connections involved can be brought to terminal blocks which can be installed at any time through provisions incorporated in the design of the standard control panel.



PARALLELING REACTOR—requires a paralleling reactor assembly for each unit and interconnections between the controls of all units. Provision is made in the design of the standard control panel to permit adding this equipment easily at any time.

OUT-OF-STEP INTERLOCK—requires the addition of out-of-step cams, in-step relays and a control switch, and can be installed at any time with a minimum of labor through provisions incorporated in the design of the standard control panel and drive mechanism.

E L E C T R I C C O M P A N Y

Regulating Transformers • Step Voltage Regulators • Primary Unit Substations • Secondary Transformers • Industrial Dry Type Transformers • Capacitors • Magnetic Components for Electronics

ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

This could be you—"In the Land of No Distributors."

Imagine for a minute a "never-never" land where the distributor did not exist!

A simple specification calling for wire, conduit, fittings, circuit breakers, switches and tape would require, on *your* part, telephone calls, telegrams, letters and a multitude of orders to manufacturers *all over the country!*

Every day it would be the same story.

In addition, "in the land of no distributors"—

- **deliveries would be chaotic.**
- **you would have to carry a tremendous inventory (and insure it).**
- **you would be besieged by hundreds of different salesmen.**
- **your "over-the-counter" purchases would be a major endeavor.**
- **your order department and accounts payable department would have to be increased a hundredfold.**

That's why dependable electrical manufacturers advise you to always buy from

YOUR DISTRIBUTOR—THE BEST FRIEND YOUR BUSINESS CAN HAVE! He's the *one* source for *everything* electrical—and he's local.

It Must Be Right

The Trade Mark of TOP Quality

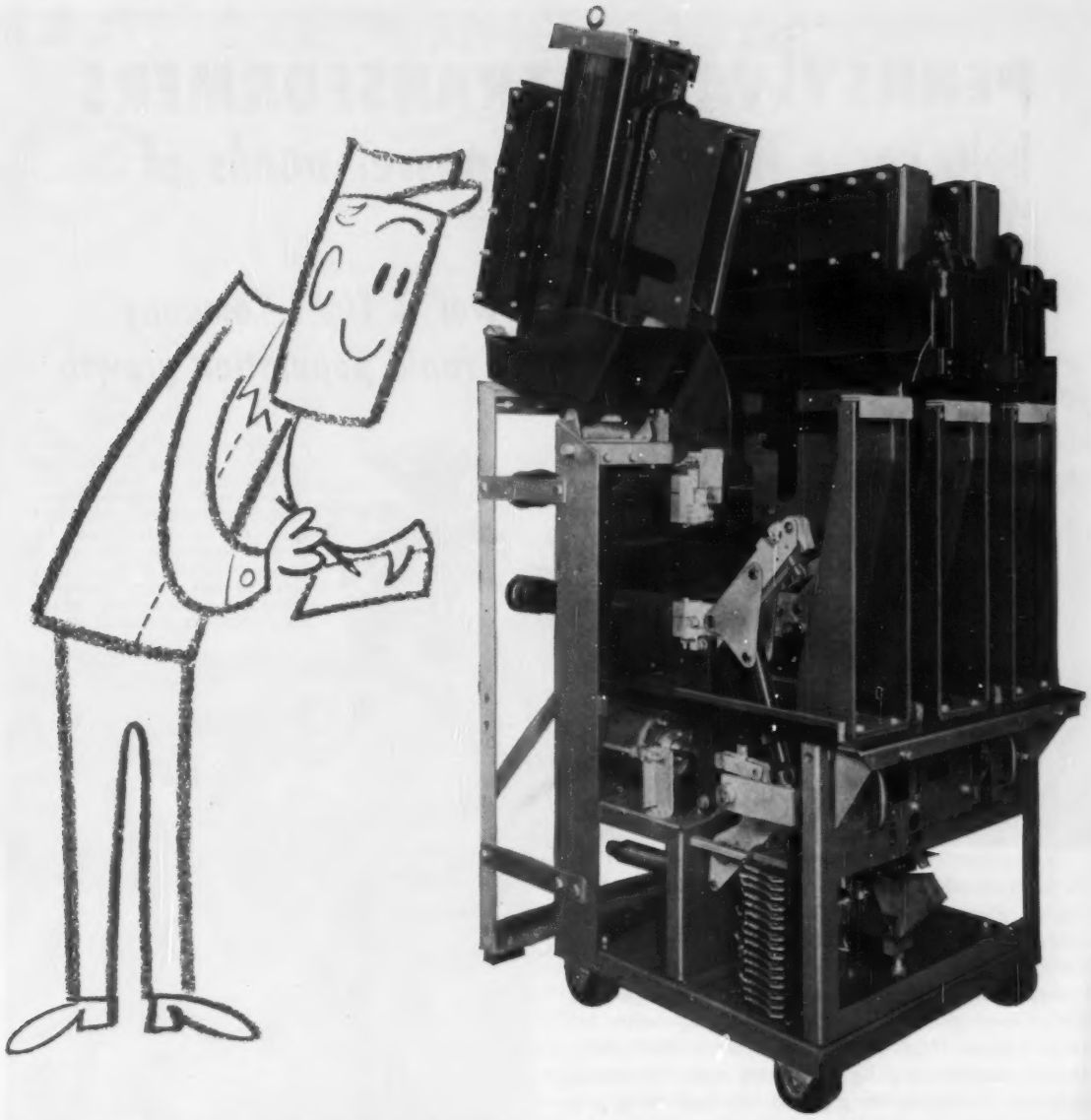
TRIANGLE

TRIANGLE CONDUIT & CABLE CO., INC.

NEW BRUNSWICK, NEW JERSEY

Manufacturers of Arteries for Electricity, Liquids and Gases

WIRE • CABLE • CONDUIT • BRASS and COPPER TUBE • PLASTIC PIPE



SEE VALUE HERE YOU'LL SEE NOWHERE ELSE

Operating engineers in the electrical industry often say you can see the higher quality in I-T-E switchgear even when you stand 'way back.

Of course, they're only partly right. You can easily see the practical component arrangement, the all-welded steel construction with compartments designed to retain shape even when lifted as a unit, and the clean, neat appearance. These are standard on all I-T-E switchgear.

But we want you to look closer—see even more. For example, in Metal-Clad Switchgear: the easy-to-service horizontal drawout design; the tilting arc chutes; the extra-heavy insulation. There's quality in every detail—quality that means dollars' more value for your switchgear investment and years' longer troublefree service.

Why not phone the I-T-E office nearest you. Or write for bulletin 7004 giving a complete description of 5, 7.5 and 15 kv switchgear. I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Phila. 30, Pa.

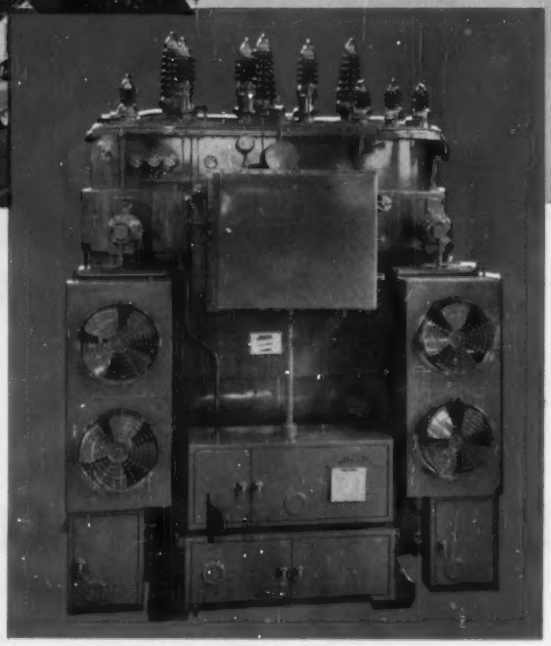
I-T-E

I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division

PENNSYLVANIA TRANSFORMERS
help serve the growing power needs of 'The Land of Sunshine'

. . . as Florida Power & Light Company meets the challenge of rapid population growth

Artfully concealed in this apartment-like building at Deauville Substation is a 30,000 Kva Pennsylvania Autotransformer custom-designed to meet rigid space requirements. These included movement through a 12-foot doorway from an alley only 14 feet wide. Clearance above and on three sides of the installation site are equally close.



To keep ahead of Florida's rapid population growth, Florida Power & Light Company has tripled its system power capabiiity since V-J Day. With 742,000 Kw now and 1,102,000 Kw planned by 1957, Florida Power & Light Company is meeting challenges like that of metropolitan Miami — where population has jumped from 375,000 to 740,000 since 1947. Residential construction, light industry and commercial business — all demanding power — are growing proportionately.

Pennsylvania Transformers are playing important roles in Florida Power & Light's multi-million-dollar expansion program. At the Deauville Substation, for example, the 30,000 Kva Pennsylvania LTC Autotransformer shown here ties the 66,000-volt system into the 33,000-volt lines that serve Miami Beach. This unit was custom-designed to satisfy exacting space requirements while maintaining the high performance standards for which Pennsylvania is noted. It includes a tertiary winding of 13,800Δ volts which will enable Florida Power & Light Company to keep the transformer in service when the company discontinues its 33,000-volt transmission lines, as it plans ultimately to do.

Pennsylvania Transformer Company is proud to play a part in Florida Power and Light Company's program for the rapidly growing Sunshine State.

The 30,000 Kvà Pennsylvania Autotransformer now in service at Deauville Substation has LTC equipment for plus and minus 5% regulation in 32 steps of 5/16%. A forced-oil unit with two air coolers, it has a high voltage of 66,000Y volts, a low voltage of 33,000Y volts, and a tertiary voltage of 13,800Δ volts.

Pennsylvania Transformer Company

A McGraw Electric Company Division

CANONSBURG, PA. . ***Greater Pittsburgh District***

ELECTRICAL BUSINESS OUTLOOK

Electrical World
JANUARY 9, 1956

Electric utility capital spending to top $3.9 billion this year. That compares with $3.7 billion in '55 and is based on over 90% of the returns in Electrical World's annual survey. Capital expenditures by privately owned utilities are estimated at $2.9 billion, up from $2.7 billion last year.

Biggest spending gain comes in "miscellaneous" category. For all electric utilities its 31.9% above 1955. This represents expenditures for new office and service facilities and greater mechanization of routine utility operations. Spending for transmission facilities will be up 15.3% and for distribution, 9.8% above last year. Generation shows a decrease—3.4% below 1955.

But sharp rises in December peaks call for another look at generation. Sample check by EW indicates peaks of 78 companies were underestimated by 2.6%. Translated into installed capability for the whole industry that would be 3 million kw. It means the industry will have to set its sights higher on installation of new capacity.

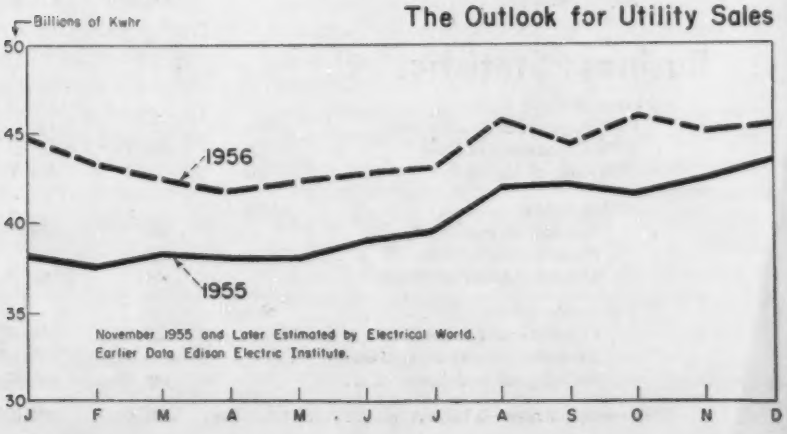
These were cold weather peaks pointing up the growing importance of heating loads in some areas. Pacific Northwest peaks, for instance, came during cold snap in November and topped expected January peaks. Heating also contributed heavily to peaks in South.

Another boom year for appliance sales is in the making. Manufacturers believe gains will run from 3.5 to 30.5% on various household items. It'll be across-the-board except for ironers and conventional washers.

Air conditioning sales are in for boost with new spurt in non-residential building. Carrier Corp foresees sales reaching $3.2 billion, thus topping last year's record of $2.9 billion.

Outlook for utility sales growth shown below reflects downward drift in the industrial production index during early part of year in contrast to rise during all of 1955. Another factor is tapering off of rapid climb in sales to Atomic Energy Commission. AEC use is expected to reach a plateau in July. Rise in August is due mainly to peaking commercial load combined with seasonal climbing industrial production. October high coincides with peak industrial production for the year.

The Outlook for Utility Sales



STATISTICS

Farms with Electricity Continue to Increase

Year	Number	Percent of All Farms	Increase Over Last Report	
1954	4,448,462	93.0	234,863	Up 5.6%
1950	4,213,599	78.3	1,425,975	Up 51.2%
1945	2,787,624	47.6	755,308	Up 37.2%
1940	2,032,316	33.3	1,191,006	Up 141.6%
1930	841,310	13.4	388,690	Up 85.9%
1920	452,620	7.0	—	—

Source: Bureau of Census, U. S. Department of Commerce.

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Oct.	112.13	110.91	100.01	12.1
Peak—Class I Systems (million kw)	Oct.	90.6	90.1	79.9	13.4
Estimated Dec. '55 Peak (million kw)	Oct.	96.72	96.82	96.21	0.5
Estimated Dec. '56 Peak (million kw)	Oct.	104.34	104.31	102.85	1.4
Production—billion kwhr	Oct.	47.37	46.33	40.46	17.1
Hydro		8.77	8.17	7.83	12.0
Fuel		38.60	38.18	32.63	18.3
Sales—billion kwhr	Oct.	43.16	43.51	36.18	19.3
Residential		10.33	10.58	9.36	10.4
Commercial		6.87	7.36	6.32	8.7
Industrial		23.45	22.84	18.14	29.3
Other		2.51	2.72	2.36	6.4
Fuel Consumption	Oct.				
Coal—million tons		12.66	12.07	10.34	22.4
Oil—million barrels		6.04	5.18	5.32	13.5
Gas—billion cu ft		104.75	120.17	108.60	−3.5
Net Income Class A & B Co's—$ million	Oct.	95.67	100.23	86.80	10.2
Residential Customers—millions	12 mos.	44.10	43.96	42.82	3.0
Revenue per kwhr	ended	2.66¢	2.66¢	2.70¢	−1.5
Avg kwhr per customer	Sept. 30	2,698	2,682	2,497	8.0
Avg annual bill		$71.77	$71.34	$67.42	6.5

Business Statistics . . .

Indexes: 1947-49 = 100					
FRB Industrial Production	Nov.	144	143	128	12.5
ENR Construction Cost	Nov.	141.1	141.2	134.7	4.8
BLS Cost-of-living	Nov.	115.0	114.9	114.6	0.3
NEMA Sales	Oct.				
Insulation materials		156	156	117	33.3
Electric appliances		118	131	102	15.7
Household refrigerators		64	85	51	25.5
Wholesale prices	Nov.				
Motors and generators		127.0	125.2	121.7	4.4
Transformers and regulators		129.2	129.2	128.1	0.9
Switchgear and fuses		146.2	146.1	135.3	8.1
GNP—annual rate—$ billion	3rd Qtr.	392.0	384.8	358.8	9.3

Your Business

This is your business—your personal business—a department we hope will be as valuable to you as EW's well-established features.

In telling you about this service, we don't propose to define the department too precisely. In this respect we are reminded of recent attempts to arrive at a definition of automation. Wrote a man from Virginia:

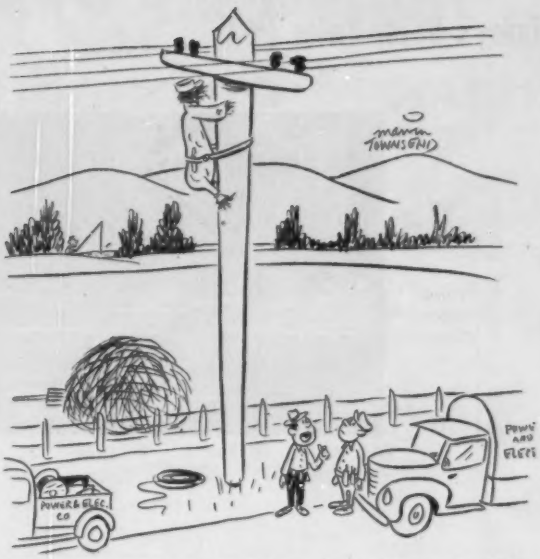
"There's a process that's called 'Automation'
That's swiftly engulfing the Nation;
But if asked to define it,
I'd rather decline it—
Than risk some machine's abnegation."

And so it is with us. But we do plan to make this page a mine of helpful tips about your business and personal affairs with, perhaps, a chuckle thrown in now and then.

Part of our personal service to you includes a watchful eye on your health. With us regularly on this page will be Dr Rex H. Wilson, medical director of B. F. Goodrich Co in Akron. A man of indisputable qualifications and extensive experience in industrial medicine, he will write on everyday health problems. Dr Wilson has been practicing medicine since 1935 when he began his internship in Chicago Presbyterian Hospital. He has held his present position with Goodrich since 1946. He is a member of 22 medical associations and organizations, including the American Medical Writers' Association. We believe you will find Dr Wilson's health discussions valuable and entertainingly written.

Appropriate to our health subject this week is the yarn we heard concerning Citizens Utilities Co, drunken starlings, and Yankee ingenuity. Line to ground faults, plaguing Citizens' Berkshire substation, were found to be caused by tipsy starlings. Citizens tried bigger insulators on the 44-kv equipment but could not deter the birds. And thus, back to prohibition. It was found the starlings were getting high on fermented cherries. Citizens' drastic solution: Chop down the cherry trees.

One more thing. We will have a cartoon regularly. For our caption to the cartoon in the next column, we are indebted to Rip Isaacs of Pennsylvania Transformer Co.



"Must be another one of those Straw Bosses checking on our work!"

Your Health

REX H. WILSON, MD, Medical Director, B. F. Goodrich Co

Should I have a drink? This is a common question. There is no conclusive answer. If you have an irresistible desire to drink, you are either a chronic alcoholic or a dipsomaniac. Since a drunkard cannot drink moderately, he should not drink at all.

For many people drinking with friends is exciting and pleasant. If you drink alone, the excitement seldom occurs. Drinking should never be an occupation, but rather a pleasant interlude. It is said that alcohol is a great social leveler—don't let it level you.

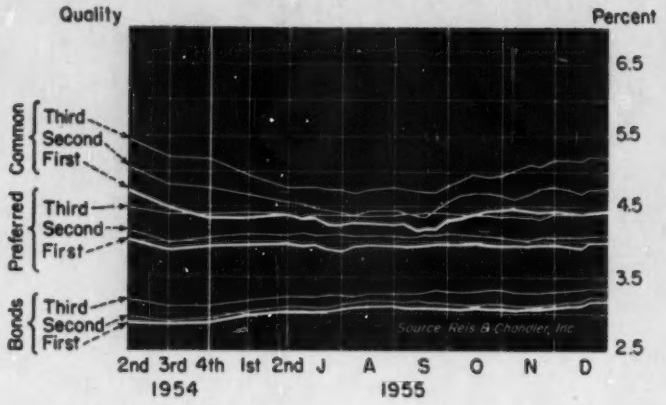
You may get relaxation from an alcoholic drink. Alcoholic beverages in small amounts (1-3 ounces daily) are said to have a beneficial effect on the blood vessels. Small quantities of alcohol produce a feeling of well being. Large quantities depress the brain functions and remove the normal restraints. Self-control is lost and movements become unsteady.

A chronic alcoholic must have a drink even when he knows that it will harm him. He drinks while his liver and heart degenerate.

Normally the blood and urine contain less than 0.1% alcohol. You are feeling your liquor when the blood concentration reaches 0.2%. With concentrations of 0.3% you are confused and unsteady. Stupor occurs with a blood alcohol concentration of 0.4%. It takes only a little more to cause death.

Why settle for 50 years when you could have 100?

Today's Utility Yields (%)



	BONDS			PREFERRED STOCKS			COMMON STOCKS		
QUALITY.....	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Dec. 29.....	3.12	3.16	3.31	3.98	4.08	4.39	4.46	4.77	5.18
Dec. 22.....	3.13	3.16	3.31	3.98	4.07	4.41	4.44	4.76	5.16

Utility Earnings

COMPANY	PERIOD MONTHS ENDED		NET INCOME 1955	NET INCOME 1954	EARNINGS PER COMMON SHARE 1955	EARNINGS PER COMMON SHARE 1954
Central Vermont Public Service	12	Nov.	$1,426,583	$1,287,797	$1.31	$1.18
Consumers Power	12	Nov.	28,311,293	26,458,508	3.26(a)	3.11(a)
Detroit Edison	12	Nov.	26,062,227	21,586,127	2.41(a)	2.01(a)
Gulf States Utilities	12	Nov.	10,635,434	9,518,445	2.16	1.89
Montana Power and subsidiaries	12	Nov.	8,541,661	7,583,852	2.95	2.61
Ohio Edison, consolidated	12	Nov.	23,252,529	20,132,196	3.53	3.02
Portland General Electric	12	Nov.	4,967,654	4,276,284	1.66	1.43
Southern Company, consolidated	12	Nov.	25,961,509	23,473,447	1.43(a)	1.29(a)
Texas Utilities, consolidated	12	Nov.	24,110,991	22,633,011	2.04	1.92

Notes—(a) Based on average shares.

Utility Financing

COMPANY AND DESCRIPTION	AMOUNT OF OFFERING (000)	OFFERING PRICE	YIELD TO PUBLIC
SCHEDULE FOR JANUARY—FEBRUARY—MARCH			
BONDS			BID DATE
Central Power & Light—1st mtg due 1986	$10,000	.....	Feb. 14
Pennsylvania Electric—1st mtg due 1986	25,000	.....	Feb. 15
Dallas Power & Light—1st mtg due 1986	10,000	.....	Feb. 15
Texas Electric Service—1st mtg due 1986	10,000	.....	Feb. 28
New England Power—1st mtg	10,000	.....	.....
PREFERRED STOCK			
New Orleans Public Service—60,000 sh $100 par	$6,000	.....	Jan. 11
Pennsylvania Electric—90,000 sh	9,000	.....	Feb. 15
COMMON STOCK			
Texas Utilities	$15,000(a)	.....	Jan. 31
Southern Indiana Gas & Electric—83,030 sh (to be offered commonholders on 1-for-11 basis, record Feb. 21 to expire Mar. 8 with no oversubscription privileges)	.....	.....	.....
Northern States Power (to be offered commonholders)	.....	.....	.....

Note—(a) Estimated.

FINANCIAL BRIEFS

New Security Issues Planned—Atlantic City Electric Co plans to sell 75,000 shares of common stock through an underwriting group headed by Union Securities Corp and Smith, Barney & Co. . . . Southern California Edison has asked California Public Utilities Commission approval for exemption from competitive bidding on an estimated $30-million new issue of preferred stock. . . . Alabama Power Co is planning to sell $14 million of first mortgage bonds competitively on Mar. 15. . . . Georgia Power Co will sell, competitively, $16 million in first mortgage bonds on Mar. 29. . . . Mississippi Power Co is planning to sell $4 million of first mortgage bonds and 40,000 shares of new preferred stock. Both the bonds and the preferred stock are scheduled to be sold competitively on Mar. 1.

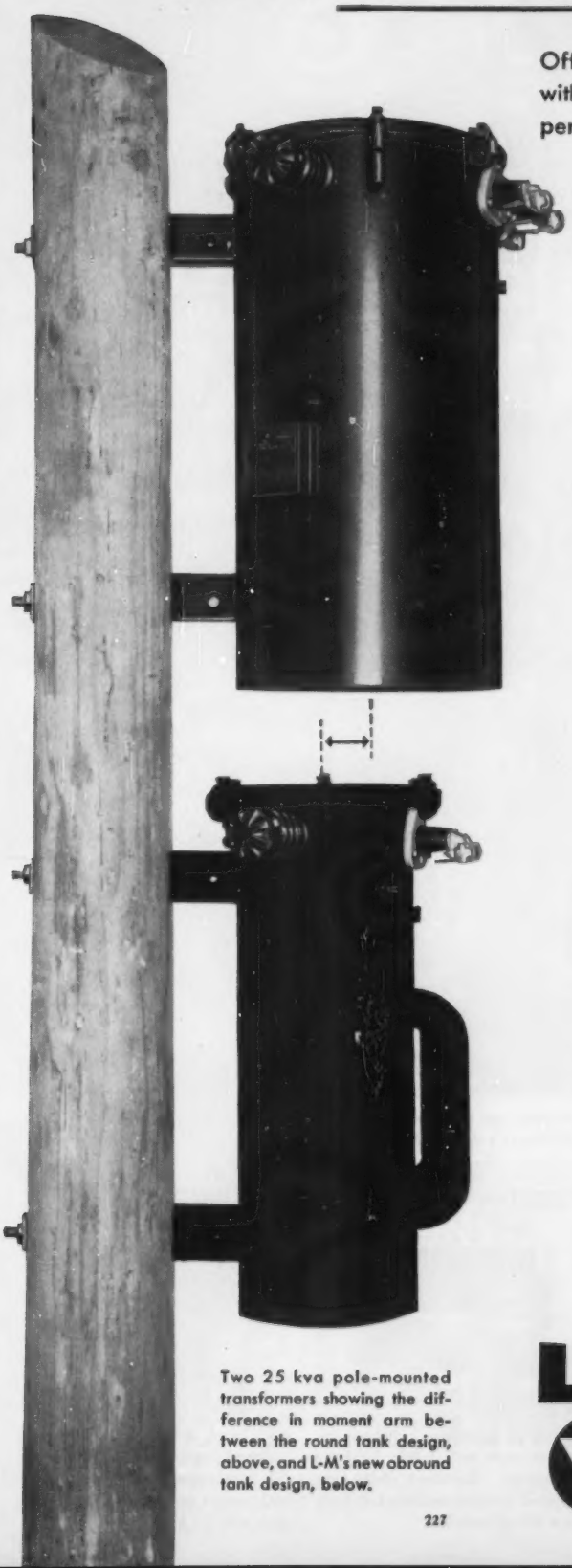
TVA Reimburses Treasury—Tennessee Valley Authority has sent to the United States Treasury a $13-million check in payment on funds appropriated by Congress for its power facilities. The payment increased to $27 million the amount paid to the Treasury in the current fiscal year, TVA said. Also, it boosted to $178,131,529 total payments made to date by the government agency.

Exchange of Stock Planned—Louisville Gas & Electric Co has received Kentucky Public Service Commission approval to offer stockholders the right to convert each 5% preferred share of $100 par into four 5% preferred shares of $25 par value. Present plans call for the conversion privilege to run from about Jan. 9 to about Mar. 9. Any of the $100 shares still outstanding at the end of that period would be redeemed at $110 a share plus dividends to the date of redemption.

Utah Public Service Commission has directed gas, power, and telephone firms to note on each customer's bill the exact amount he is being charged for the 2% municipal tax on gross receipts of such firms in Salt Lake City while city officials study increase.

Higher Dividend—Savannah Electric & Power Co will pay Jan. 16 a quarterly common stock dividend of 42¢ a share as compared with 37½¢ a share in the previous quarter.

How L-M's New Obround Design Provides 27% Less Bending Moment



Two 25 kva pole-mounted transformers showing the difference in moment arm between the round tank design, above, and L-M's new obround tank design, below.

Offers 33⅓% increase in transformer capacity on a pole, with no sacrifice of L-M's outstanding Round-Wound® performance characteristics.

L-M's new obround tank design is smaller, lighter, and has a shorter moment arm on the pole. The total bending moment is substantially reduced. Thus the potential capacity of all your transformer structures is greatly increased. L-M's new obround tank design retains all the outstanding Round-Wound performance characteristics.

Less Weight, Shorter Moment Arm

The new obround design has a smaller tank with less transformer oil, resulting in a lighter, easier-to-handle transformer. Cooling tubes are installed where required to provide adequate cooling surface. Transfer of heat from copper to outside air is faster and more efficient because of reduced mass.

The new obround design also reduces the moment arm distance from the pole. The combination of less weight and shorter moment arm distance greatly reduces the total bending moment on the pole.

COMPARE 50 kva *round* tank design and L-M's new 50 kva *obround* tank design:

50 kva ROUND tank design:
Moment arm from center of pole.....1.6 ft.
Weight.....860 lbs.
Bending moment 860 x 1.6.....**1,376 ft.-lbs.**

50 kva L-M OBROUND tank design:
Moment arm from center of pole.....1.33 ft.
Weight.....760 lbs.
Bending moment 760 x 1.33.....**1,010 ft.-lbs.**

L-M's new 50 kva *obround* transformer puts *27%* less bending moment on the pole than the 50 kva *round* tank design. That means that you put less strain on your structures—or you can now hang three 50 kva's where you formerly hung three 37½'s—a 33⅓% increase in capacity.

Round-Wound Performance

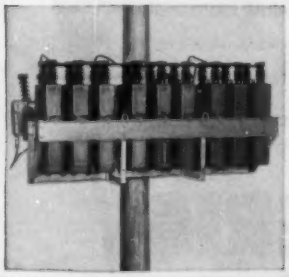
The advantages of less weight and shorter moment arm were accomplished without changing L-M's outstanding Round-Wound performance characteristics. These characteristics include low exciting current, high impulse strength, high short-circuit strength, and high short-time overload capacity.

Get Details on L-M's Obround Transformer

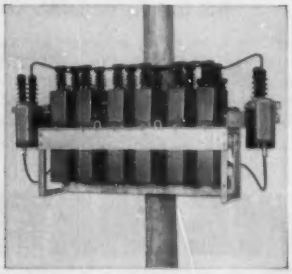
Ask the L-M Field Engineer for application information, weights and dimensions on L-M obround transformers and the exclusive Round-Wound design. Or write A. B. Coyle, Product Manager, Line Material Company, Transformer Division, Zanesville, Ohio (a McGraw Electric Company Division).

LINE MATERIAL
LM® Transformers

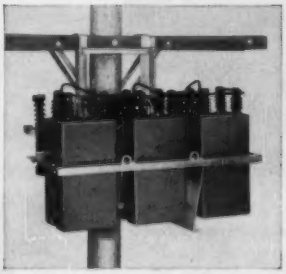
L-M's new 50 kvar capacitors are now available in 600 kvar switched capacitor racks. Assembly weighs only 43% more than a 300 kvar rack. Capacitor unit has same width, same thickness as a 25 kvar capacitor and will fit into existing NEMA standard hangers and L-M single-row racks.



450 kvar single-row switched capacitor rack with L-M's Elemex 50 kvar capacitors. Weighs only 12% more than a 300 kvar single-row rack with 25 kvar capacitors.

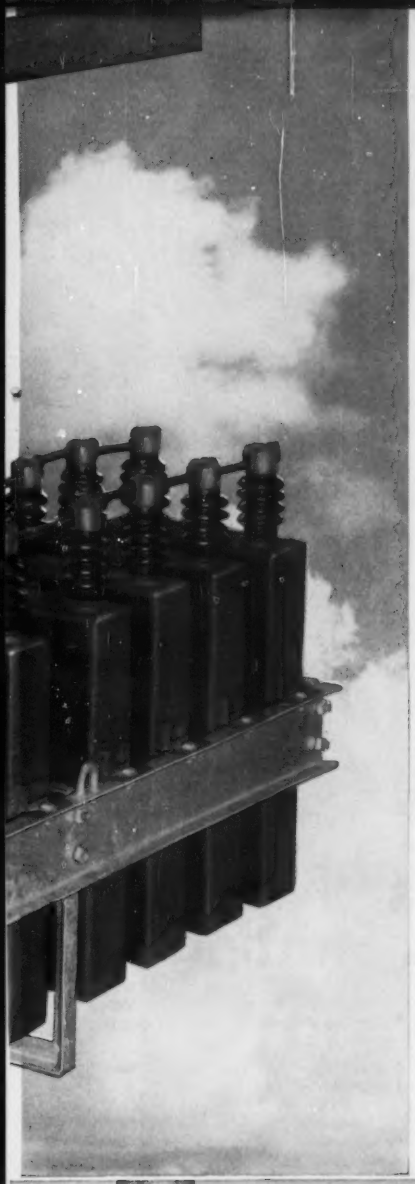


300 kvar single-row switched capacitor rack with L-M's Elemex 50 kvar capacitors. Assembly is quick and easy to install, inspect, and maintain.



300 kvar multi-row switched capacitor rack with L-M's 50 kvar capacitors. Switched racks are supplied with dependable L-M Kyle type NR oil switches.

450 kvar, 2400 volt multi-row switched capacitor rack with L-M's 50 kvar capacitors. Weighs only 150 pounds more than a 300 kvar rack with 25 kvar capacitors.



L-M's New 50 KVAR Capacitors Provide Greater Capacity Per Pole

Offer less weight and less pole space per KVAR

By **N. K. DELANEY**
Product Manager
Capacitors and Regulators
Line Material Company

Now you can hang capacitor racks of larger capacity on a pole with L-M's new 50 kvar Elemex® capacitors. Racks are factory-assembled and wired, shipped ready to install on distribution systems rated 2400 to 13,800 volts, multi-grounded wye. Bank sizes may be up to 450 kvar switched, 600 kvar unswitched multi-row racks, and up to 600 kvar switched or unswitched single-row racks.

Less Weight per KVAR

Line Material's new 50 kvar, 2400 volt capacitor weighs 109 pounds compared to 68 pounds for a 25 kvar unit. A 600 kvar, 2400 volt unswitched multi-row rack weighs only 51% more than a 300 kvar rack, and a 600 kvar, 2400 volt switched single-row rack weighs only 43% more than a 300 kvar rack.

Less Space per KVAR

L-M's new 50 kvar unit has the same width, same thickness as a 25 kvar capacitor and only 10 inches of additional height. It fits into existing NEMA standard hangers and into L-M's present single-row rack. Capacity of a single-row rack can be *doubled* with L-M's 50 kvar capacitors. A 450 kvar single-row switched rack with 50 kvar capacitors is approximately 2 feet narrower than a 300 kvar rack with 25 kvar capacitors. Handling, installation and maintenance costs per kvar have all been reduced with L-M's new 50 kvar unit.

Other Features of L-M's Elemex Capacitors and Capacitor Rack Assemblies

Elemex capacitors are individually dried and completely impregnated under vacuum with low-temperature Elemex liquid dielectric.

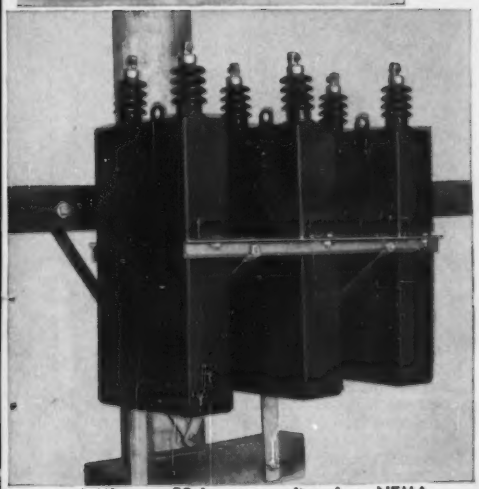
Unit has strong solder-sealed bushings of one-piece wet-process porcelain, "Paragroove" clamp-type connectors, and aluminum metallic coating under alkyd resin paint.

Assemblies have only one plug-in connection point per phase for control wiring, and one terminal box for all three phases.

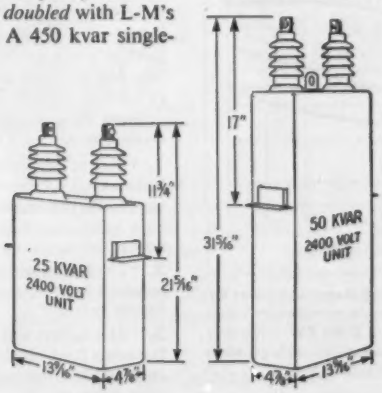
Assemblies are of complete bird-proof construction; terminals have neoprene rubber caps, plus 5 kv insulated conductor for high-voltage connections.

Get Complete Information

Ask the L-M Field Engineer for information on features, design, and delivery on the new 50 kvar Elemex capacitors and capacitor equipments. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



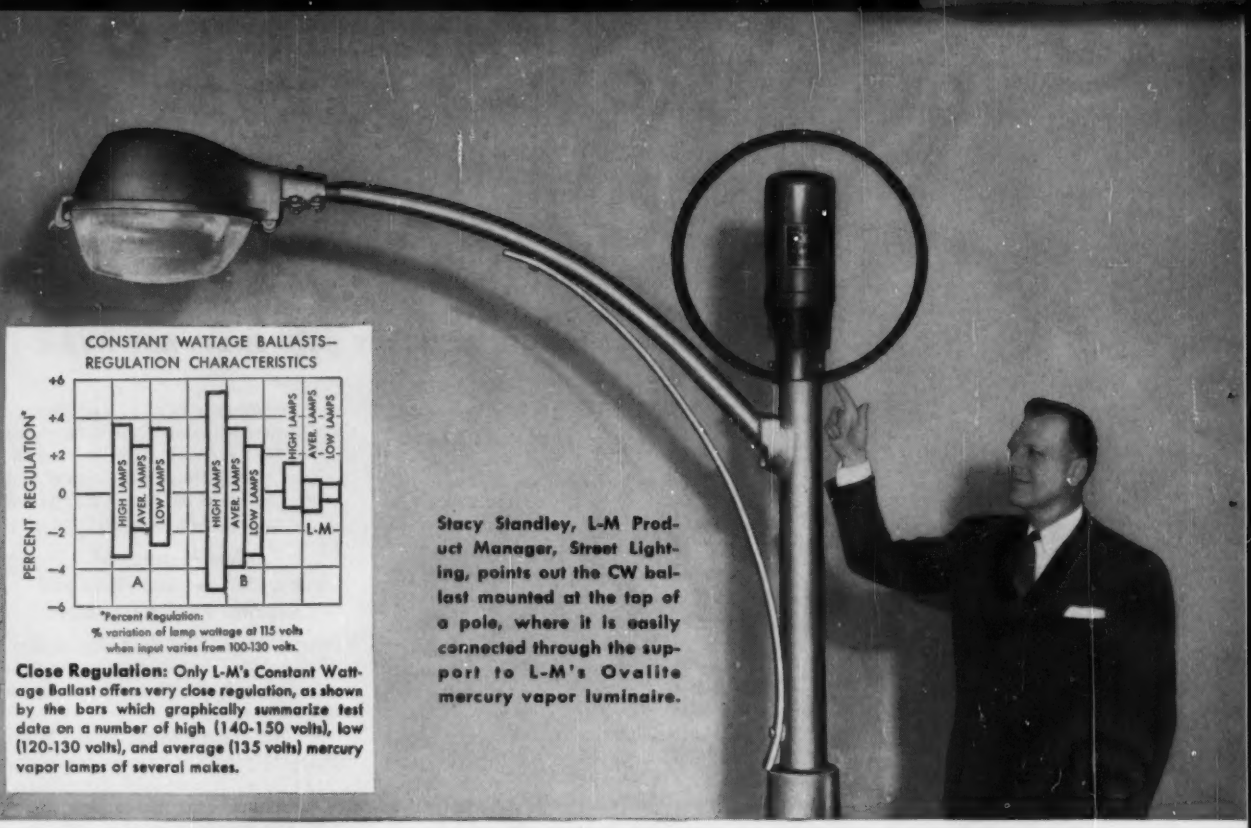
L-M's new 50 kvar capacitors in a NEMA standard hanger. The capacitor has the same width, same thickness as 25 kvar capacitor and 10 inches of additional height. The three units provide 150 kvar—50% more than four 25 kvar units.



Only 10 inches of additional height gives twice the capacity.

LINE MATERIAL

Elemex® Capacitors



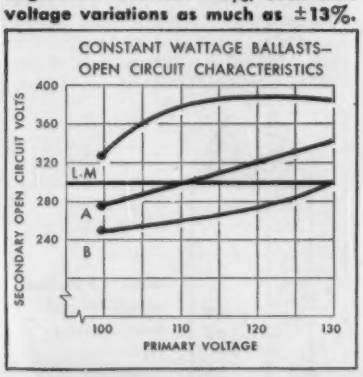
*Percent Regulation:
% variation of lamp wattage at 115 volts when input varies from 100-130 volts.

Close Regulation: Only L-M's Constant Wattage Ballast offers very close regulation, as shown by the bars which graphically summarize test data on a number of high (140-150 volts), low (120-130 volts), and average (135 volts) mercury vapor lamps of several makes.

Stacy Standley, L-M Product Manager, Street Lighting, points out the CW ballast mounted at the top of a pole, where it is easily connected through the support to L-M's Ovalite mercury vapor luminaire.

CW Ballast Assures Uniform Light Output . . . Outstanding Below-Zero F. Starting

L-M's new Constant Wattage (CW) Ballast assures more uniform individual light output for mercury vapor systems than do other mercury vapor ballasts. Regulation is within ±2%, even with voltage variations as much as ±13%.



Cold-Weather Starting: Heavy line shows the average voltage required to start mercury vapor lamps at −10 degrees F. L-M's CW is the only ballast providing this secondary voltage when primary voltage drops below 115.

According to published data, at least 300 volts are required to start 95% of H-400 E-1 lamps at 10 degrees below zero, Fahrenheit. In tests (see curves at left) with two other constant wattage ballasts of approximative design, the L-M CW maintains the highest open-circuit voltage, and is the only one that maintains over 300 volts at primary voltages below 115. Therefore it will start lamps at temperatures well below zero.

According to L. F. Joy, Electrical Superintendent of the city of Fairbanks, Alaska, L-M ballasts gave no trouble whatever; and, Mr. Joy adds, no trouble was experienced in starting even at 50 degrees below zero.

From its own laboratory and field tests on the CW ballast, a large utility concluded;

1. "This ballast operates at normal current in locations where tanks on other ballasts have burst previously." (This is believed to have been caused by the greatly increased flow of harmonic current into the ballasts.)

2. "The ballast will enable lamps to provide constant light output over a wide range of supply voltage."

3. "The ballast will not cause undue lamp burnouts due to high wattage, since it allows even 140-150 volt lamps to draw little more than 400 watts."

4. "The ballast will not burn out as a consequence of lamp burnouts, since its open-circuit current is low."

5. "The ballast will start lamps at extremes of low temperature."

Other Advantages of the CW

Primary volt-amperes of the L-M CW are very uniform, compared to much wider fluctuations of other ballasts. Split primary winding permits connecting the CW to either 100-130 or 200-260 volts. Since the same CW ballast may be used for pole base, pole top or aerial applications, you stock only one ballast.

Isolated secondary winding permits grounding the secondary when desired.

Added features are that the L-M CW is galvanized, then painted. It has a watertight, moisture-proof seal. Neoprene-covered leads are brought out through tightly fitting neoprene plugs. The CW is 1 to 2 pounds lighter than other ballasts.

Get Complete Information

L-M makes a full line of incandescent, mercury vapor, and fluorescent luminaires, and offers you the benefits of its well-known Application Engineering Service. Ask the L-M Field Engineer for bulletins and information. Or write Line Material Co., Milwaukee 1, Wis. (a McGraw Electric Company Division).

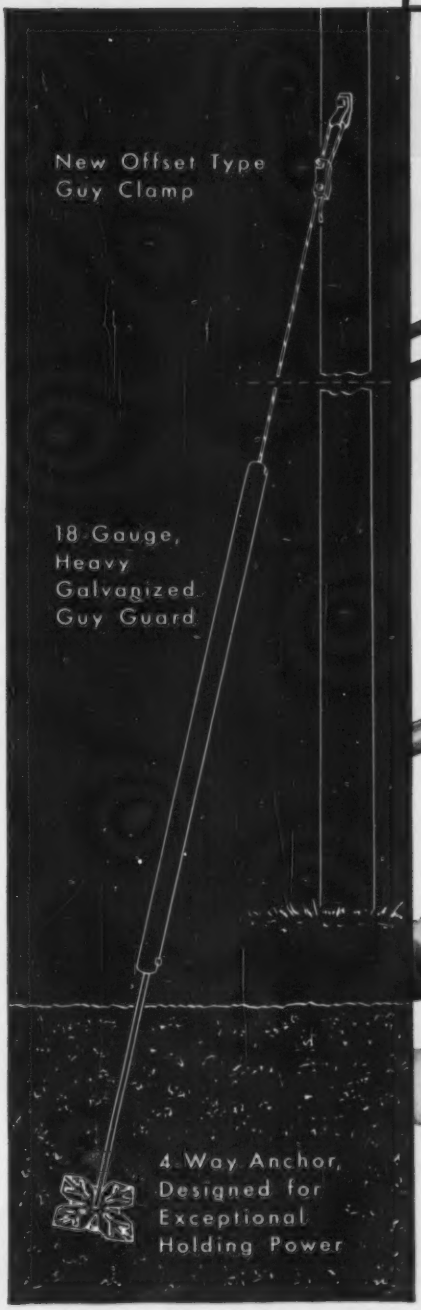
"CW" and "Ovalite" are Line Material Company trademarks.

LINE MATERIAL *Street Lighting* 230

LINE CONSTRUCTION MATERIALS

To Meet Your Guying Needs

OFFSET GUY CLAMPS, GUY GUARDS, ANCHORS



L-M's New Offset Guy Clamp

Two sizes: Cat. No. 221522A2 for 5/16" to 1/2" Guy Wire
Cat. No. 221522A1 for 1/4" to 3/8" Guy Wire

Here's a new guy clamp design with superior holding power—in excess of the breaking strength of the strand accommodated.

The offset grooves tend to snub the cable under load, effectively restraining the slip of the cable.

L-M's new offset guy clamp saves on initial cost and installation time.

L-M's Guy Guard *clamps firmly*

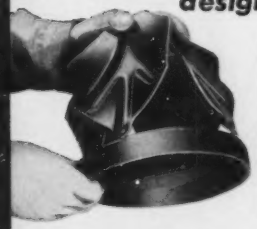
Cat. No. 280024B1 Length 8 Feet; 280024B2 Length 7 Feet

L-M's guy wire protectors have a tight anti-rattle hook at upper end and unique anchor rod clamp at lower end. Position of bolt on side of protector facilitates tightening of lower clamp. No loose parts to fall out.

Body is 18-gauge steel with a heavy hot-dip galvanized coating to assure long-lasting protection. Available in two lengths.

L-M's 4-Way Pressed Steel Expanding Anchors

designed for exceptional strength



Catalog Number	Nominal Holding Power Class—Pounds	Anchor Rod Diameter—Inches	Minimum Mechanical Strengths, Pounds
200026B1	6,000	⅝, ¾	18,000
200026B2	8,000	⅝, ¾	21,000
200026B3	10,000	1	24,000
200026B4	10,000	⅝, ¾	24,000

Two-piece design . . . The four blades are formed of a single piece of steel and coordinate with the sturdy base plate to develop maximum holding power.

Blades are designed to provide minimum resistance to earth penetration during installation and maximum resistance to pull-out when in expanded position.

These anchors have been thoroughly tested and approved by major utility companies. You can depend on them to hold!

Thousands of Line Construction Specialties

These are just a few of thousands of L-M line construction specialties warehoused nation-wide to serve your needs. Contact your L-M Field Engineer, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

331

LINE MATERIAL *Line Construction Materials*

SKIMPY WIRING
"Dead End" Kid of the
Electrical Business!

WE'RE PULLING HIM OUT OF HIDING!

Kennecott is exposing Skimpy Wiring...to help you sell more power!

There he is! Skimpy Wiring — the underhanded rascal who's blocking power sales in more than 80% of the homes in your area!

Hiding unnoticed in the walls of your customers' houses, Skimpy Wiring represents the biggest single threat to the electrical business today. However, once Skimpy Wiring is exposed, folks see him for what he really is — an electrical troublemaker who should be done away with!

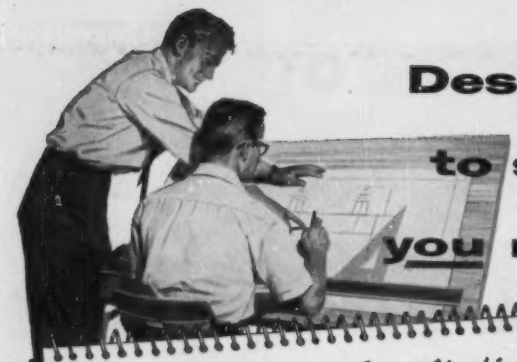
That's the reason for full-page Kennecott ads like the one shown below. They hammer home the story of safe, adequate wiring. Co-ordinated with your own efforts, Kennecott's campaign will add national impact and prestige to local adequate wiring promotions, can help boost your sales of power! Tie in with it now!

FREE! TIE-IN MATERIAL!

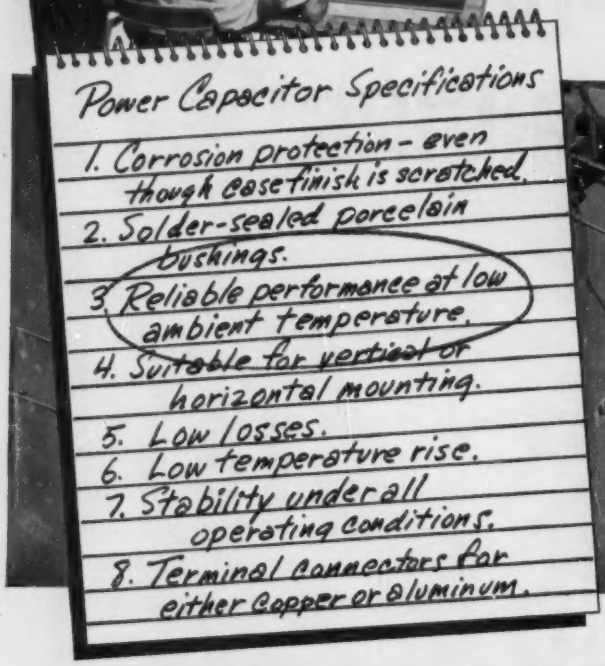
Send today for free reprints and poster-size blow-ups of Kennecott Saturday Evening Post and This Week magazine ads. Get free copies of the educational booklet, "The ABC of Home Wiring." Ask for complimentary Home Wiring Wall Chart, mat service folder and list of *at-cost* prices of all available material. No cost, no obligation! Simply write Kennecott Copper Corporation, Dept. **W16,** 161 East 42nd Street, New York 17, N. Y.

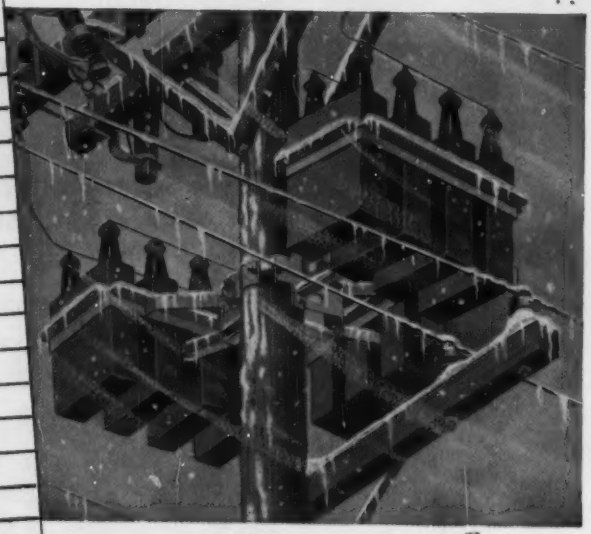
Kennecott Copper Corporation

Fabricating Subsidiaries: CHASE BRASS & COPPER CO. • KENNECOTT WIRE & CABLE CO.



Designed and built to specifications you might have written...


Power Capacitor Specifications
1. Corrosion protection - even though case finish is scratched.
2. Solder-sealed porcelain bushings.
3. Reliable performance at low ambient temperature.
4. Suitable for vertical or horizontal mounting.
5. Low losses.
6. Low temperature rise.
7. Stability under all operating conditions.
8. Terminal connectors for either copper or aluminum.



SANGAMO POWER CAPACITORS

Perhaps *you* were one of the many utility men Sangamo engineers talked to before starting to build "the power engineer's capacitor." In these talks we found out you wanted not only a capacitor that will release system capacity, raise system voltage and reduce system losses – but one that will do these things under all operating conditions.

The reason for the Sangamo Capacitor's reliable operation in low surrounding temperatures is Sangamo Diaclor, the high-strength, low-loss liquid dielectric which completely fills the capacitor. This characteristic permits switching of capacitor banks even after long periods of de-energization at low ambient temperatures.

So no matter what winter brings—snow, ice, freezing rain—even 40 degrees below zero, Diaclor enables Sangamo Capacitors to go right on doing their jobs just as though it were a mild spring day.

For more details, write today for Bulletin 1120.

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

ADVERTISEMENT

LIVE BETTER

LIVE BETTER

Elec

Comin, soon—very soon—the greatest residential load-building drive the electrical industry has ever known.

Its theme?
LIVE BETTER . . . ELECTRICALLY.

Its objective? To sell *all* the benefits of electrical living, and increase residential load. It will directly benefit everyone connected with the electrical industry—utilities, manufacturers, distributors, dealers, contractors and trade allies.

You'll be hearing more about it soon.

ctrically

LIVE BETTER
ELECTRICALLY

***New* from INTERNATIONAL...**

New "go-anywhere" light-duty 4-wheel drive truck!

Here's the four-wheel-drive truck you've been waiting for! Here's a full-size, all-purpose truck you can use to go anywhere.

On or off the road, this new INTERNATIONAL S-120(4x4) will take the toughest grades in stride—fully loaded, it will move entire 7,000 lbs. of truck, body and cargo through soft sand, mud or snow. It's made to match all light-duty 4x4 jobs *exactly* with choice of 2 engines, 3 pickup and 2 stake bodies. Has exclusive INTERNATIONAL power take-off transfer case, plus optional power take-off transmissions for auxiliary equipment operation, is available in 6 tire sizes, including 7:00x18 for extra clearance and 9:00x16 for extra flotation and traction.

This newest INTERNATIONAL is all-truck built for rough, tough four-wheel-drive service . . . built to save you the BIG money, the operation and maintenance money. Before you buy any light-duty 4x4 truck, see and drive this one at your INTERNATIONAL Dealer or Branch!

INTERNATIONAL HARVESTER COMPANY • CHICAGO

A Complete Line of Light and Medium 4x4s for Every Tough Job Need

S-140(4x4). 11,000 lbs. GVW. Has 4-speed transmission and 2-speed transfer case, for 8 forward and 2 reverse speeds. 2 transmission power take-offs. Provision for third on transfer case.

S-160(4x4). 15,000 lbs. GVW. Has same transmission and transfer case as S-140 model, and like S-140 and S-120 has famous full-size Comfo-Vision cab and exclusive INTERNATIONAL features for easiest four-wheel-drive steering and handling.

INTERNATIONAL® TRUCKS

All-Truck Built to save you the BIG money!

Motor Trucks • Crawler Tractors • Industrial Power • McCormick® Farm Equipment and Farmall® Tractors

"Lookee here, Babe," murmured Paul Bunyan admiringly, in a voice like distant thunder. Babe, the Blue Ox rolled an eye. "This here's a BAXCO cedar pole. ✻ See how purty she is—straight, and round an' well manufactured. Babe, that there's a real POLE." The Great Logger smiled with pleasure. "Them Baxter folks shore knows their business."

BAXCO
WESTERN RED
CEDAR POLES

✻ Thanks, Paul. But we'd like to add that, besides being "purty," our cedar poles are supplied either full-length treated or butt-treated according to the most rigid specifications. Of course they didn't treat wood in your day, Paul, but for your information this low-cost preservative protection adds years and years of life to BAXCO Cedar poles. Besides, the Baxter people maintain large inventories at strategic points throughout the country and can offer their customers prompt shipments from adequate stocks. Immediate attention given to all inquiries.

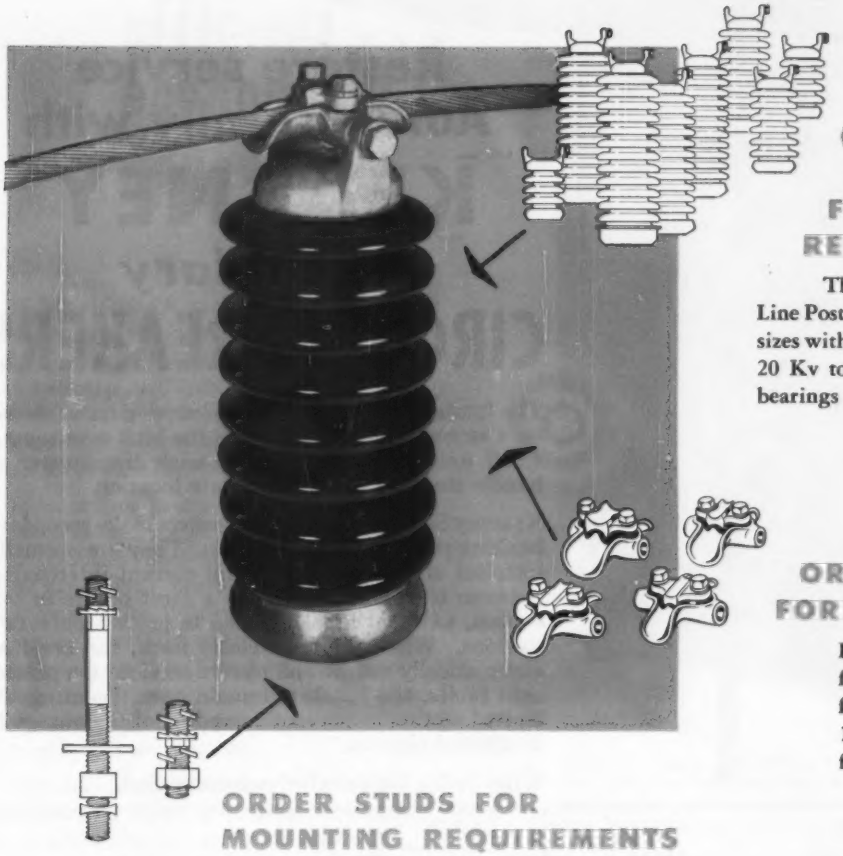
©J. H. Baxter & Co. 1955

J. H. BAXTER & CO. *120 Montgomery Street, San Francisco 4, California*

LOW INVENTORY

and ECONOMICAL WAREHOUSING

with LAPP CLAMP-TOP LINE POSTS



ORDER INSULATORS FOR VOLTAGE REQUIREMENTS

The series of Lapp Clamp-Top Line Posts consists of insulators in eight sizes with ratings for line voltages from 20 Kv to 88 Kv. Caps with trunnion bearings are identical in all sizes.

ORDER CLAMPS FOR CABLE SIZES

Four sizes of clamps (choice of ferrous or aluminum) provide for conductors of sizes .25" to 1.50" diameter. Every clamp fits every insulator size.

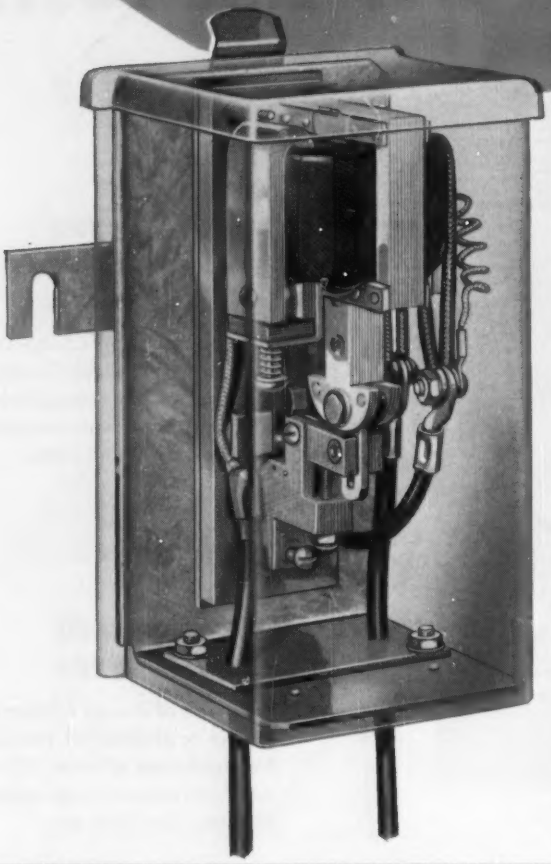
ORDER STUDS FOR MOUNTING REQUIREMENTS

Studs on Lapp Line Posts are separable. 7" studs for wood cross-arms, 1¾" studs for metal mounting—or longer studs to go through poles for horizontal mounting of insulators—are interchangeable, and may be installed in the field. Serrated surfaces in insulator base and stud flange engage a "positive" lock washer—provide a permanent vibration-proof attachment.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

Take full advantage of banked secondaries...

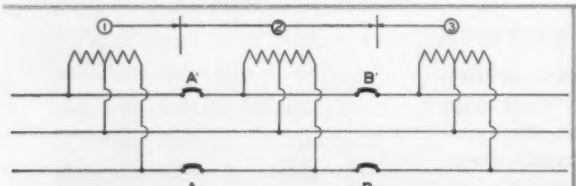


Restore service Automatically with KEARNEY *Secondary* CIRCUIT BREAKERS

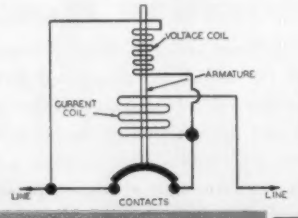
The fundamental advantage of banking transformers on a secondary is to distribute the load over several small units rather than force each transformer to handle the load in its immediate location.

Kearney Secondary Circuit Breakers make secondary banking practical and profitable. They are normally installed at points of minimum current interchange between transformers. When a fault occurs in one section, adjacent breakers open to protect unfaulted sections. When the fault clears itself, the breakers automatically reclose and restore service. On permanent faults, the breakers remain open, isolating the faulted section to prevent cascading of the outage to unaffected circuits.

Write today for descriptive information.



Portion of a typical banked secondary with sectionalizing breakers AA' and BB' installed



Internal wiring details of the breaker showing potential and current coils

282

For Better Construction...Safer Maintenance

Specify KEARNEY PRODUCTS

JAMES R. KEARNEY CORPORATION

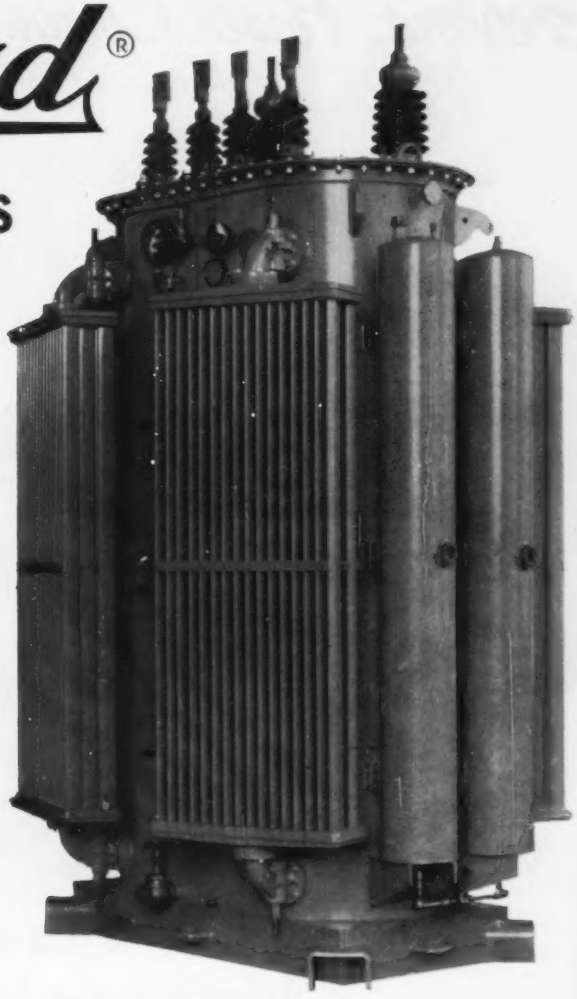
The Mark of Quality

JAMES R. KEARNEY CORPORATION • 4324-42 CLAYTON AVENUE, ST. LOUIS 10, MISSOURI • Canadian Plant: GUELPH, ONTARIO

Standard®

POWER TRANSFORMERS

efficient . . .
economical . . .
dependable



2500 KVA, single-phase, OISC power transformer, 34,500 volts primary, 2400x4800 volts secondary. Special design to meet customer's specifications. Standard engineers will work with you to meet your requirements.

● Where power requirements demand above-average reliability and efficiency, Standard Power Transformers are your one best choice. Figures taken from service records show how Standard's sound engineering principles cut maintenance costs to the bone and boost transformer life.

Standard engineers work with your engineers to incorporate the transformer design features and specific components that meet your needs most efficiently. Bushings, tanks, finishes, covers, and accessories meet ASA specifications and are rigidly inspected by Standard. Each transformer, regardless of size, is subjected to all standard commercial tests—both during and after manufacture.

We can build transformers to your specifications as quickly and economically as if you'd bought repetitive designs.

There's a Standard Transformer representative near you. Call him. He'll work with you to produce the best transformers you've ever used.

Standard®

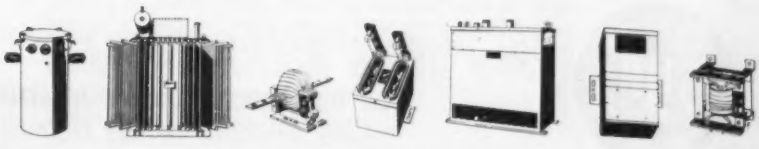
THE STANDARD TRANSFORMER COMPANY

WARREN, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

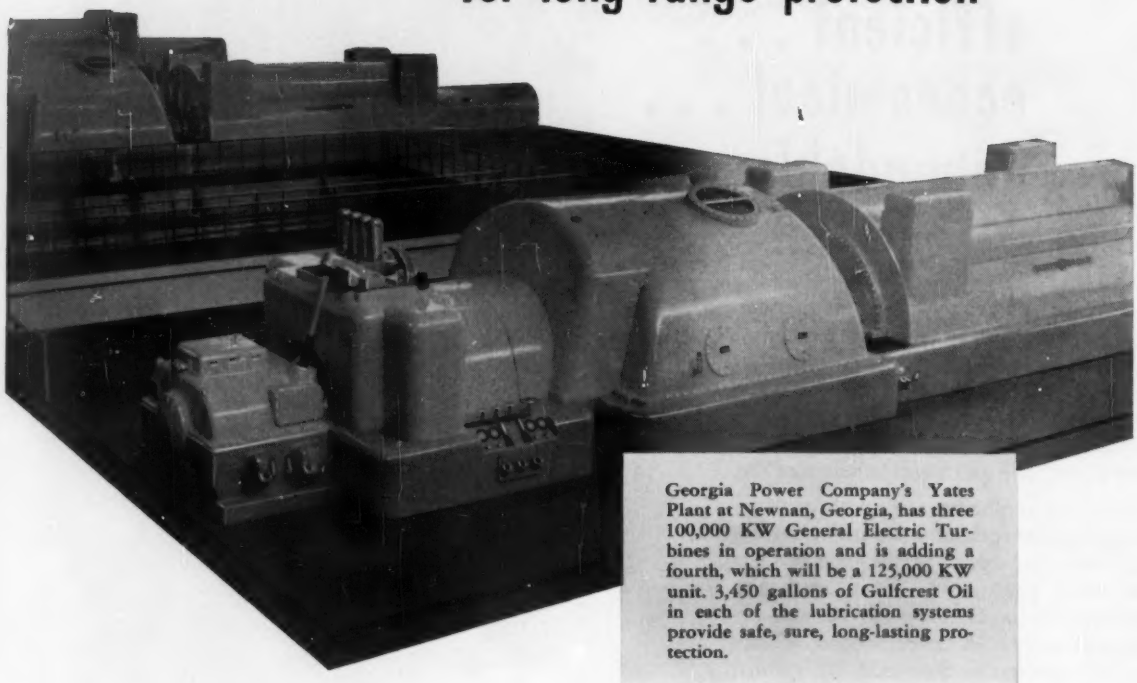
Transformers

FOR EVERY APPLICATION



Georgia Power Company looks ahead—

selects GULFCREST OIL for long range protection



Georgia Power Company's Yates Plant at Newnan, Georgia, has three 100,000 KW General Electric Turbines in operation and is adding a fourth, which will be a 125,000 KW unit. 3,450 gallons of Gulfcrest Oil in each of the lubrication systems provide safe, sure, long-lasting protection.

Gulfcrest Oil has been in service at the Yates Plant of Georgia Power since 1950. Turbine systems are clean, there is no rust, sludge, or foam. But this is only the beginning. Gulfcrest will provide safe, sure protection for many years to come. (Gulfcrest has been in continuous service in several large turbines for over 20 years.)

There are good reasons for Gulfcrest's recognition as the world's finest turbine oil. Carefully selected crude oils are thoroughly refined, then super-refined by Gulf's exclusive Alchlor Process. This removes the unstable hydrocarbons that accelerate oxidation, form sludge and harmful acids. Then the right additives are properly combined, and you have a turbine oil that delivers superior performance in every type of steam turbo-generator.

A trained, experienced lubrication expert—the Gulf Sales Engineer—is as near as your telephone. Have him recommend the right grade of Gulfcrest for your turbines. Consult the telephone directory for the number of your local Gulf office.

GULF

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

GULF OIL CORPORATION • GULF REFINING COMPANY
1822 GULF BUILDING, PITTSBURGH 30, PA.

NEW!

T&B complete COLOR CODED splicing package speeds line and service work

Now one new UT 5 installing tool is the *only* tool you need to make all line and service compression connections . . . including splicers, taps, and pin terminals. And T & B's color-coding insures accurate, speedy connections on a wide range of copper, aluminum and A. C. S. R. cable. Here's all you do . . . match the color of the die to the color of the connector . . . compress . . . and the joint is made.

Your T & B Distributor will be glad to demonstrate the UT 5 with its many advantages. When you use this one tool you simplify all your line and service work. For further information write for new T & B bulletin.

LOOK FOR THIS SIGN — T&B ENGINEERED

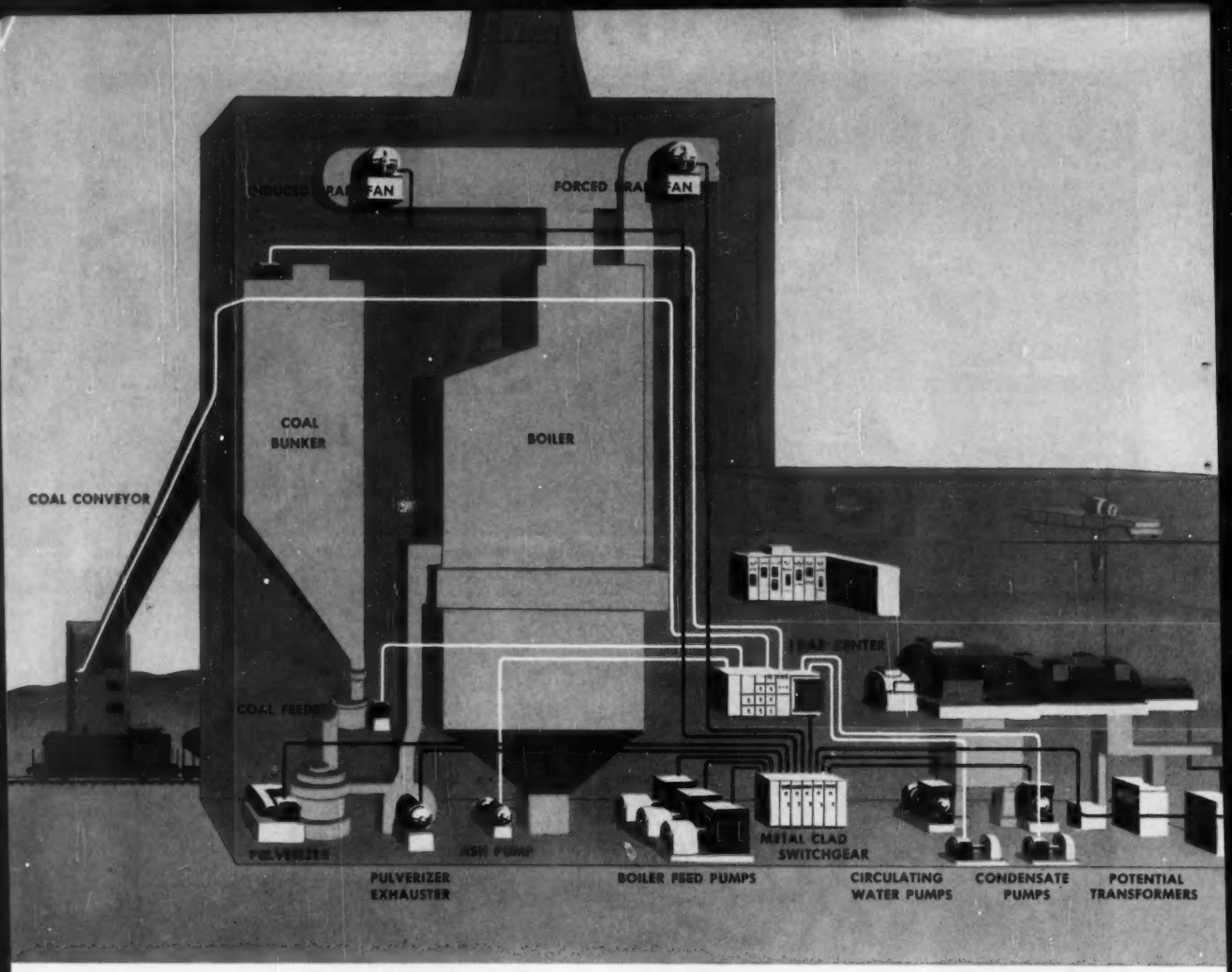
IT'S THE MARK OF AN AUTHORIZED T & B DISTRIBUTOR

The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs. T-61

THE THOMAS & BETTS CO.

INCORPORATED

14 Butler Street • Elizabeth 1, New Jersey
Thomas & Betts Ltd., Montreal, P.Q., Canada
MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898



G-E VCI for station auxiliaries and material costs and provides

In planning today's modern generating stations to meet present and future needs, utility engineers give careful consideration to the selection of cables. They know that the choice of the proper cable can effect saving in material cost, ease and economy of installation, space saving, accessibility, and greater latitude in the placement of auxiliary equipment.

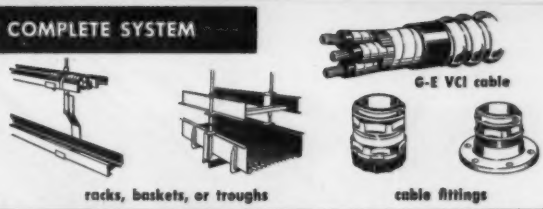
To attain these important objectives, leading electric utility companies are using General Electric varnished-cambric interlocked armor cable for station auxiliary cables. G-E VCI cuts material and installation costs, does not require conduit, and eliminates extensive engineering layout time. Because of its flexibility, G-E VCI cable provides for easy changes in location during construction or service. Its accessibility in open racks makes it easily avail

cuts installation for future growth

able for visual inspection or relocation.

You'll find some of G-E VCI's outstanding advantages illustrated on the right. For more specific information on how G-E VCI can cut installation and material costs in either industrial plants or generating stations, write Section W168-127, Wire and Cable Department, General Electric Company, Bridgeport 2, Connecticut.

A COMPLETE SYSTEM



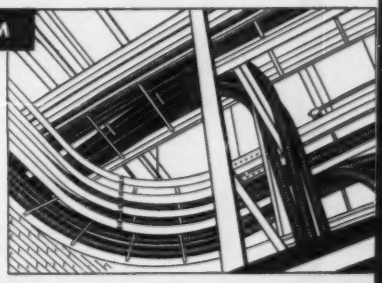
LESS SPACE NEEDED

3-500 MCM rubber cables in 3-inch conduit.

3/c 500 MCM VCI cables.

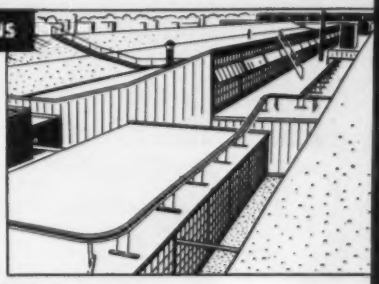
CORNERS ARE NO PROBLEM

VCI can be bent around corners and over beams without elbow fittings.

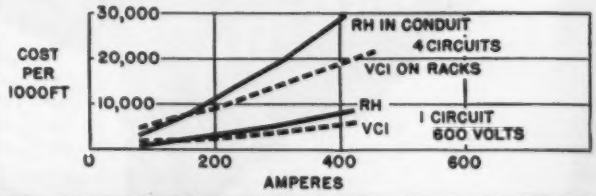


LONGER CONTINUOUS RUNS

G-E VCI can be pulled in long lengths over roofs, down shafts, across areaways without splices or joints.



LOWER MATERIAL COST

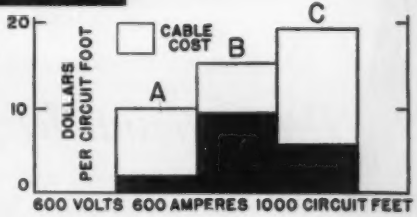


REDUCED INSTALLATION COST

A. Two 3/c 350 MCM VCI cables in parallel.

B. Two 1/c 350 MCM cables per phase, in conduit.

C. Bus.



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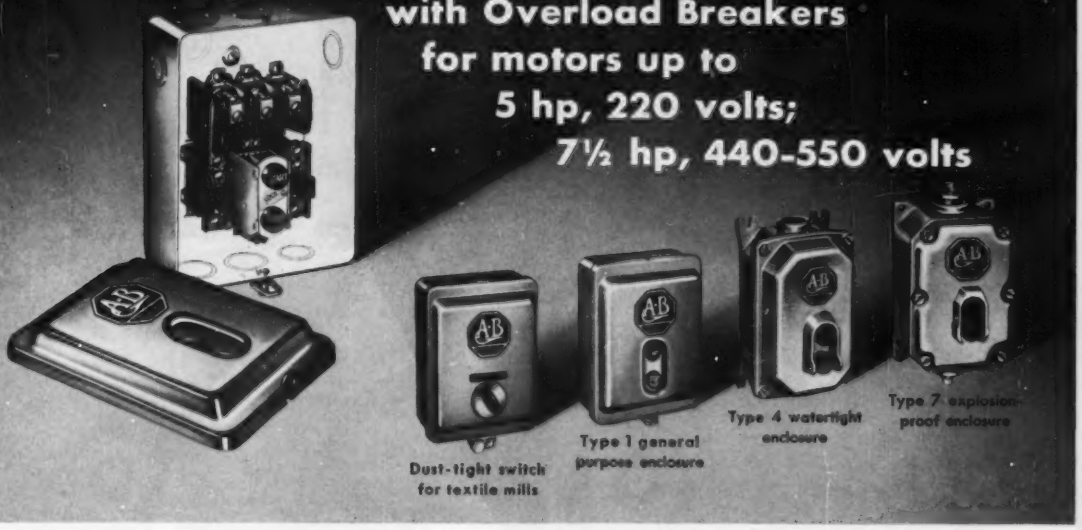
THE NATIONAL TELEPHONE SUPPLY COMPANY

Manual Across-the-Line Motor Starters

with Overload Breakers for motors up to 5 hp, 220 volts; 7½ hp, 440-550 volts


Dust-tight switch for textile mills
Type 1 general purpose enclosure
Type 4 watertight enclosure
Type 7 explosion-proof enclosure

When it comes to manual motor starters, the Allen-Bradley Bulletin 609 line has everything . . .

1—A quick-make, quick-break manually operated switch;

2—Push buttons, no hand lever;

3—Double break, silver alloy contacts that are maintenance free;

4—Continuously dependable and accurate thermal overload breakers;

5—A full line of enclosures.

For installations not requiring either remote control or the safety of automatic control, the Bulletin 609 manual starter is an economical and reliable answer. Since these manual starters cannot provide no-voltage protection, they should be used only for installations which can create no personal injury hazards, if the motor should restart by itself when line voltage is restored. Available up to 5 hp, 220 v; 7½ hp, 440-550 v. Send for literature and prices covering this complete line of starters.

Allen-Bradley Co., 1327 S. First St., Milwaukee 4, Wis. • In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

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ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

a day with

. . . makes YOUR day more profitable

You stand to benefit several significant ways by the visits of your friendly Kuhlman representative. He brings you the experience of both a highly skilled technician and a successful businessman. He capably represents his company—a pioneering organization that has specialized in manufacturing top-quality transformers for more than 60 years.

His company is small enough to get answers fast by avoiding red tape and inter-departmental tie-ups. Yet, his organization is large enough to get you the right answers, having been repeatedly recognized by the industry for its outstanding contributions in design and performance.

He represents a national network of 51 Kuhlman sales and service offices, 23 regional warehouses, and 3 conveniently located factories anxious to serve you immediately —whenever and wherever the need arises. In your behalf, he has immediate access to all headquarters personnel. Your Kuhlman representative can become an important additional man on your staff . . . to make your job easier—your days more profitable.

finding the facts—*firsthand*

Your Kuhlman representative likes to look at your problems—firsthand. He'll ask permission to inspect your facilities out on-the-job even though it takes extra time and effort. He knows that field checking assures straight thinking about your particular transformer problems. You'll find your Kuhlman representative coming up with practical, specific ideas that will save money and improve service like no amount of desk-top talk can ever do.

your KUHLMAN representative

enlarging your staff—*with specialized skills*

Your Kuhlman representative is a successful businessman in his own right. His business judgement is highly valued by his clients and at his parent company. Both his business skill and his technical knowledge can mean money to your organization. Many of his customers look on him as an additional, important man on their staffs. You, too, can use his skills . . . they are at your service whenever you desire.

getting headquarter's help—*in a hurry*

Your Kuhlman representative has direct access to the top personnel at headquarters when working on your problems. Without delay, his request sends our top engineering, research and production personnel to work on your problem—right now. With problems and with planning, your Kuhlman representative can be a source of up-to-the-minute ideas . . . a check against current practices in the field . . . a reliable source of product information.

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ELECTRIC COMPANY

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ELASTIC—
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AND WEATHER

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FULLY
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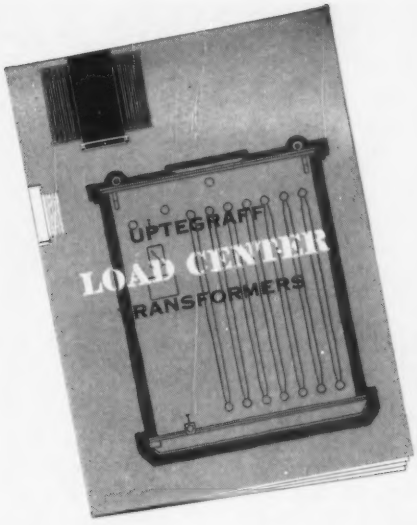


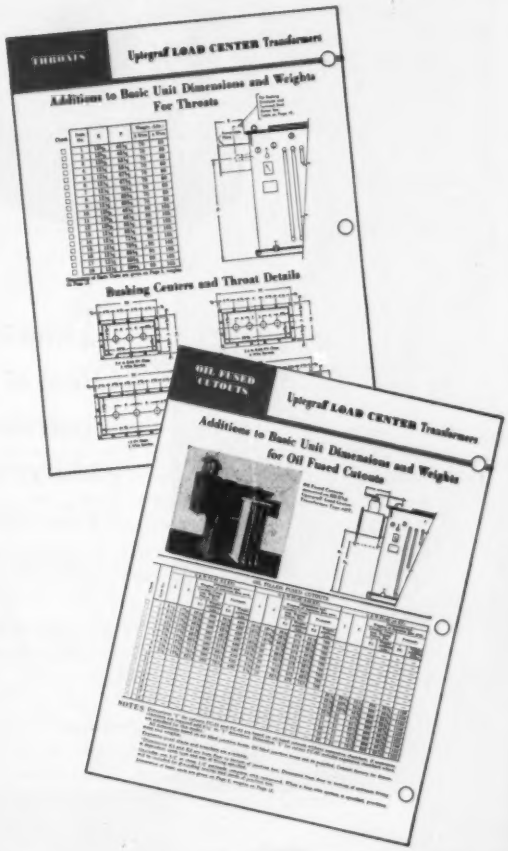
Uptegraff Announces a complete series of

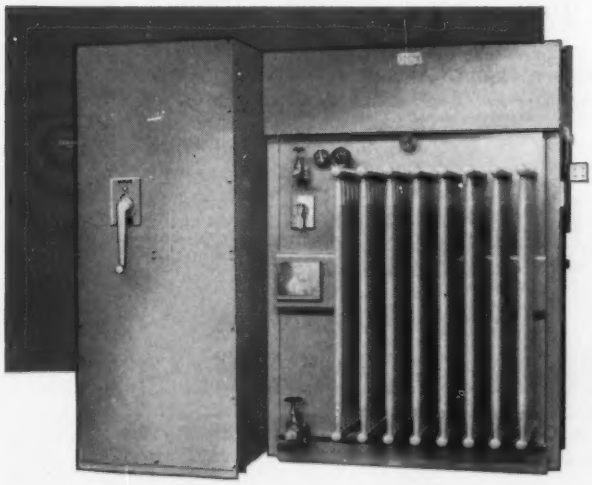
LOAD CENTER TRANSFORMERS

(150-2500 KVA)

Uptegraff announces a new series of *Liquid Filled* Load Center Transformers, made in eighteen ratings, from 150 to 2500 KVA., 3-phase. Designs are based upon extensive experience with this type of transformer, and represent modern engineering and manufacturing practice.

To simplify the selection and arrangement of auxiliary equipment, we have prepared a unique brochure, some pages of which are shown here. With this brochure, you can readily determine overall dimensions, total weights and other information for any combination of the Basic Transformer Unit with various types of switches and accessories. A check system permits the easy and accurate locating of desired data pertaining to various arrangements of properly rated equipment for any selected basic unit. We will be glad to send you a copy, free.


THROATS
Uptegraff LOAD CENTER Transformers
Additions to Basic Unit Dimensions and Weights For Throats
Bushing Centers and Throat Details
OIL FUSED CUTOUTS
Uptegraff LOAD CENTER Transformers
Additions to Basic Unit Dimensions and Weights for Oil Fused Cutouts



R. E. Uptegraff Manufacturing Co.
Scottdale, Pennsylvania

Send **for a free copy of this 20-page data book, giving important and useful information on Uptegraff Load Center Transformers. Fill out and mail the coupon below.**

R. E. Uptegraff Manufacturing Company
Scottdale, Pennsylvania

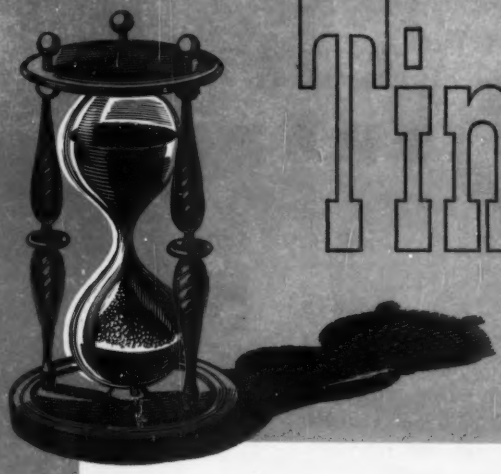
Please send a copy of your LOAD CENTER TRANSFORMER brochure, Catalog 132, to:

Name_____ Position_____

Company_____

Address_____

EW-1



Time

Time is the measure of all things. Few of man's inventions can stand its merciless judgment. Yet Kerite for 102 years has thrived and spread and gained renown. Time, indeed, gives Kerite its unqualified recommendation.

The Value And Service Life Of A Product Can Be No Greater Than The Integrity And Craftsmanship Of Its Maker.

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EDITORIALS

Salute to IES Golden Anniversary

Fifty years ago this week at the Hotel Astor in New York some 75 electrical and gas engineers met to form the Illuminating Engineering Society. At that first meeting participants decided to exchange information in the infant field of illumination and cooperate with other bodies, such as American Institute of Electrical Engineers, in advancing and improving gas and electrical illumination. Eighty-nine members were enrolled at that first meeting.

This week IES, now boasting well over 8,000 members, will commemorate the founding of the society with a luncheon, again at the Hotel Astor. All national officers and a number of past presidents will be on hand to mark the anniversary and review the outstanding accomplishments of the society during those first 50 years.

The society motto, "the advancement of the theory and practice of illuminating engineering and the dissemination of knowledge relating thereto," no more than suggests the actual accomplishments of the society. Society technical committees have promulgated a host of recommended illuminating practices relating to home, commercial, industrial, and street illumination. These are widely recognized by the electrical industry and have brought about a degree of standardization in various lighting fields. IES also makes a continuing contribution to the public through its sponsorship of basic research in the illuminating field.

Electrical World is proud to have been associated with IES from its very beginning. An EW co-editor, W. D. Weaver, was a charter member of the society and a member of its first board of managers. Weaver is credited with outlining the constitution of the organization. T. C. Martin, the other co-editor of the magazine at that time, was also a charter member and active on its committees.

Members of the EW staff have held memberships in IES since its founding. One editor was president of IES.

To those who have watched the progress of illumination from the gas mantel and carbon filament to the modern mercury and sodium vapor and fluorescent systems, the contributions of IES are apparent. Members who have actively participated have every right to be proud of their contribution to the public good.

Electrical World, which has reported the contributions of IES to illuminating progress, has every hope that the achievements over the next 50 years will overshadow even those of the past fifty.

Russia Forges Ahead

A new publication on Soviet professional manpower should be a powerful incentive to us in this country to step up our education and training of engineers. Because of the vivid comparisons drawn, the new study compels us to consider immediate steps to begin remedying our growing shortage of engineers and technicians.

Published jointly by the National Science Foundation and the National Academy of Sciences-National Research Council, the definitive study indicates that Russia is turning out engineering and technical graduates at a much faster pace than the United States. It shows that between 1928 and 1954 the Soviet Union graduated about 682,000 professionals in the engineering field as against 480,000 in the United States during roughly the same period. Engineering graduates represent about 31% of the total university graduates in 1954 in the U.S.S.R. as compared with less than 8% in the United States during the same year.

The recently released study adds emphasis to the National Science Foundation's report on shortages of scientists and engineers in industry research released in late July. That study showed that research in many fields, including the electrical equipment, has been curtailed for lack of trained engineers and technicians. In some cases companies were only able to carry on half their budgeted research. The earlier study also showed that project leaders were as hard to obtain as were down-the-line engineers.

If the U.S. is to hold its position as the number one industrial nation, it is clear that we must reinforce our ranks of engineering and technical students. It can be done without the totalitarian methods used by Russia. But the competitive threat by Russia is an effective spur to us to draw more young men into technical training.

Partial Vote of Confidence

Recently released results of a public opinion survey conducted for the National Association of Manufacturers indicates a rising confidence in business management. Some significant changes have taken place since 1949 when a similar survey was conducted.

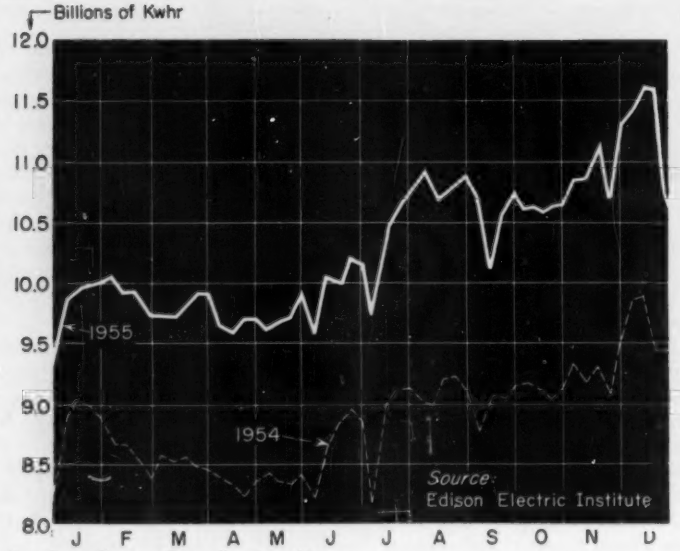
Results show that 46% of the general public believe management has a "real interest" in their welfare. Only 36% believed that in 1949.

Some 57% believed that workers are getting a fair share of company income compared with 52% in 1949.

But on the negative side, business has failed on one score to make much headway in getting its story across. Asked if there should be more or less government regulation of business, 52% thought there should be less, the same proportion which held this view in 1949. Those believing there should be more decreased from 21% in 1949 to 19%. Those who believe government regulation should remain about the same increased from 16% in 1949 to 18%.

ELECTRICAL WEEK

LAST MINUTE



OUTPUT

Week Ended Dec. 31
10,751,000,000 Kwhr
Up 14.1 %

Atomic Energy Commission requirements — 1,125,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 8.6%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Dec. 31	+14.1	+11.0	+9.8	+21.3	+8.3	+15.3	+10.7	+10.5	+15.2	+6.9
Dec. 24	+23.1	+20.3	+17.4	+32.9	+19.0	+21.7	+20.2	+10.5	+23.9	+17.9
Dec. 17	+17.1	+11.0	+9.6	+25.7	+12.2	+18.8	+13.3	+12.4	+18.7	+12.9

Seasonally Adjusted Index 210.0 Week Ago 210.3 Year Ago 178.9

Issue's Highlights—December peak load tops 100-million kw for first time in history . . . Pictures show severe floods that hit California and western Oregon, causing heavy damage to Pacific G&E property . . . Memphis officials confer with financing houses on plans to underwrite 750,000-kw municipal power plant . . . Pacific Northwest Conference told that NW power demand will exceed supply by 2-million kw in 1958 if new construction is delayed . . . TVA campaigns for more steam plants in its annual report . . . Sen Clinton Anderson (D-N.M.,) predicts fossil fuels will continue to find ready market in atomic age . . . Conflicting views on federal vs local hydro development are aired before special House subcommittee investigating Hoover Commission recommendations on water resources and power.

Management Changes—Virginia E&P has elected Erwin H. Will president to succeed late Jack G. Holtzclaw. Company also set executive committee with T. Justin Moore as chairman; Montelle C. Smith and Will are the other two members. Vice Presidents Miles Cary and Walter I. Dolbeare assume additional duties, and H. Atwood Hitch, secretary, was elected vice president. A. H. McDowell, Jr, was named operations manager and Ralph Kilday succeeds Hitch as secretary . . . Consumers Power has elected Alphonse H. Aymond, Jr, vice president and general counsel . . . General Electric has merged public relations services, employees and plant community relations services into single unit, public and employee relations services, under Vice Pres Lemuel R. Boulware.

Appliance Sales Record—Retail sales of appliances, radios, and TV hit $7.9 billion in 1955 to shatter all previous records, reports annual statistical issue of Electrical Merchandising, a McGraw-Hill publication, out this week. Sales topped 1950, previous record year, by half billion dollars. Industry also snagged biggest share ever of consumer disposable income—2.9% compared with 2.67% in 1954.

Memphis Prepares for Bids—Memphis Light, Gas & Water Commission will open bids Jan. 26 for steam boilers and steel framework for proposed 750,000-kw plant. Order for three 250,000-kw units already has been placed with Westinghouse (see p 57).

NEWS OF THE INDUSTRY BRIEFLY TOLD

Washington Wire—Atomic insurance will be made available in "unprecedented amounts" sources close to insurance industry team studying the problem reveal. AEC officials, who don't like the idea of a federal insurance program, hope atomic industry will scale down its demands, refraining from asking coverage equivalent to total corporate assets, and that insurance industry pool will be formed which can handle reasonable hazard estimates. Whole problem is due for airing when Joint Committee on Atomic Energy receives report later this month from advisory panel on impact of atomic energy and hearings on AEC's entire program begin . . . AEC has issued new regulation for licensing of persons who will handle controls of nuclear reactors.

Westinghouse Strike—Eighty-eight pickets were arrested last week at Columbus, Ohio, plant when IUE defied court order and resumed picketing to stop back-to-work movement. One died of heart attack enroute to jail but medical exam exploded union allegation of physical injury. Of those arrested, 13 were union officers or stewards. Authorities have ordered arrest of Local Pres Charles Clark for inciting to riot. Court has served notice that another violation will bring ban on picketing. Back-to-work movement resumed after riot with over 40% of normal force reporting for work. Westinghouse Pres Gwilym A. Price branded violence as "not unionism but gangsterism." He declined comment on proposal of senators to hold Congressional investigation but pointed out again that company cannot give up management responsibility. Pittsburgh editors noted pro-labor record of the 10 Democratic senators; figured their interest reflects growing union alarm over automation.

New Officers—Following merger into Square D of Electric Controller & Manufacturing. F. W. Magin, formerly of Square D, has been elected chairman and A. G. Patterson of EC&M, president. Elected vice presidents were Dr John D. Leitch and Alvin C. Dyer.

Power Contract—Following two years of negotiation, Arizona Power Authority has signed a contract to purchase up to 30,000 kw from Arizona PS' Saguaro steam plant at Redrock. Power is for resale to APA's customers, including electrical districts and cooperatives.

Los Angeles Expands—Los Angeles Water & Power Dept plans $335 million expenditure, including $250 million for power, before 1960. This is $40 million more than for last five year program.

ABOUT PEOPLE IN THE INDUSTRY

Northwest citizens "will be denied prosperity if political power cliques are allowed to blockade private capital seeking to relieve critical power shortage" in area, according to Kinsey M. Robinson, pres of Washington WP and of Pacific Northwest Power. If "public power zealots now asking to intervene in this important program are permitted to snarl the license application with FPC (for Mountain Sheep and Pleasant Valley projects), the entire economy of the Northwest will suffer," says Robinson.

Future basic supply of electric energy for PS of Colorado "undoubtedly will be produced from thermal plants," Vice Pres W. D. Virtue told New York Security Analysts. "Vast coal deposits of Colorado together with oil and natural gas reserves will provide company with abundant fuel at relatively low cost." Construction expenditures have risen from $1-2 million a year before 1946 to about $30 million a year for next four years. Anticipated 1955 earnings are $2.65 a share compared with $2.31 in 1954.

More News About People page 136

100-Million-Kw Peak in December

Peak Loads for 1954-55 Compared

	Actual 1955 Winter Peak kw	Increase Over 1954 Winter Peak kw	Increase Over 1954 Winter Peak %	Increase Over Estimated 1955 Winter Peak %	Increase Over 1955 Summer Peak %
American Gas & Electric System	3,504,000*	324,000	+10.2	−0.2	+7.8
Boston Edison Co	824,465	106,700	+14.9	.....	+19.9
Brockton Edison Co	74,000	10,800	+17.1	+5.7	+34.0
California Electric Power Co	180,000	11,600	+6.8	−2.7	−8.3
Carolina Power & Light Co	878,000	96,000	+12.8	+1.15	+8.53
Central Maine Power Co	349,035	33,185	+10.5	.....	15.5
Central Vermont Public Service	99,000	1,100	+1.25	.....	15.1
Cleveland Electric Illuminating	1,217,000	123,000	+11.25	+3.6	+6.5
Commonwealth Edison Co	3,634,000	350,000	+10.6	+5.0	+9.4
Conn. Light & Power Co	662,200*	96,200	+17.0	+8.0	+28.7
Consolidated Edison Co of N.Y.	3,215,000	168,000	+5.5	+2.06	+9.0
Dallas Power & Light Co	315,000	37,000	+13.7	−2.5	−40.5
Detroit Edison Co	2,463,000	227,000	+10.15	.....	+19.9
Duke Power Co	1,935,000*	175,000	+9.95	+1.04	+3.3
Duquesne Light Co	1,076,000	131,000	+13.9	+5.50	+11.5
EEInc and OVEC	2,850,900	1,890,000	+196.0	+21.9	.....
Florida Power & Light Co	788,000*	118,000	+17.6	+6.5	+21.0
General Public Utilities	1,650,000	21,000	+14.75	+5.8	+17.3
Georgia Power Co	1,541,000*	166,560	+12.1	+3.3	−1.1
Hartford Elect Lt—Conn Pwr Co	302,600*	20,600	+7.3	−0.3	+11.5
Kansas City Power & Light Co	480,000	37,000	+8.4	+2.12	−16.8
Long Island Lighting Co	702,000	69,000	+11.0	+.28	+43
Los Angeles Dept Water & Pwr	1,187,000	83,000	+7.5	−1.08	+1.00
Louisiana Power & Light Co	283,600	22,500	+8.6	−3.00	−16.4
New England Electric System	1,295,000	186,000	+16.80	.....	+20.5
New York State Electric & Gas Co	497,600*	19,600	+4.1	+2.8	+16.6
Niagara Mohawk Power Corp	3,104,000	325,000	+11.7	+3.3	.....
Northern States Power Co	1,097,850	142,727	+15.0	+5.9	+18.5
Ohio Edison System	1,350,000*	152,900	+12.76	+2.5	+12.6
Pacific Gas & Electric	3,700,300	367,700	+11.3	−1.35	−3.12
Pacific Power & Light Co	680,000	.....	.....	+13.9	+28.3
Pennsylvania Power & Light Co	1,038,000*	100,000	+10.65	+3.0	+8.3
Philadelphia Electric Co	2,230,000	230,000	+11.5	+4.7	+15.6
Portland General Electric Co	741,000	140,000	+23.3	+8.8†	+47.2
Potomac Electric Power Co	680,000	30,000	+4.6	−1.7	−16.1
Public Service Co of N H	258,600	36,400	+16 4	+4.69	.....
Public Service Electric & Gas	2,036,600	186,000	+10.1	+3.4	+12.0
Puget Sound Power & Light Co	483,000	105,000	+28.0	+15.8	+45.0
Rochester Gas & Electric	305,800*	31,800	+11.6	+4.6	+13.0
Seattle City Light Dept	733,000	85,000	13.0	+8.6	+52.4
Southern California Edison Co	2,284,900	287,000	+14.0	.....	+3.58
Tacoma City Light Dept	368,000	39,000	+12.0	.....	+35.8
Tennessee Valley Authority	8,298,000	1,973,000	+31.0	−1.81†	+18.0
Union Electric Co of Missouri	1,285,000	139,000	+12.15	−4.0	−7.9
United Illuminating Co	317,000*	38,500	+13.8	+7.0	+21.0
Utah Power & Light Co	487,266	53,500	+12.3	+2.8	+20.5
Virginia Electric & Power Co	1,141,600	119,800	+11.7	+1.9	+7.4
Washington Water Power Co	537,000	.....	.....	+11.2†	+27.8
West Penn Electric System	1,441,000*	163,000	+12.76	+3.59	+13.6
Totals	**66,601,016**	**9,269,172**	**+16.2**	**+2.6**	

* Electrical World Estimate
† Based on Jan '56 estimated peak

Spurred upward by early cold weather that sent the thermometer down and system loads up, utility industry peak loads last month reached the unexpected record level of 100-million kw. Industry generating capability on Dec. 31 was 120-million kw.

According to an unofficial survey by Electrical World, 1955 winter peak load of Class I utilities showed an increase of 16.2% over the 1954 industry peak of 85,580,000 kw. This represents an estimated increase in peak load of 13,860,000 kw which, when other than Class I utilities are included, brings the total peak load over 100-million kw.

Survey Covers 78 Utilities

This estimate is based on a survey that covers 78 utilities representing approximately two-thirds of all Class I utilities in the country—including those supplying power to AEC. This group of utilities reported peak loads aggregating 66,601,016 kw for an increase of 9,269,172 kw or 16.2% over 1954. This increase was 2.6% higher than was estimated by individual reporting companies.

For 1955 the increase in peak load outran generating additions by a substantial margin—3.4%. New capacity additions of 12,387,000 when adjusted and corrected for retirements showed a net total of 12,422,000 kw which contrasts with the estimated increase in industry peak load of 13,864,000 kw. Capacity additions in 1956 are estimated at 8,431,000 kw.

Early Cold Spells Bring Peak

Working with unseasonable cold weather across the country to bring this unexpected increase in peak load was a record level of pre-Christmas activity in retail stores and a year-end upsurge in industrial activity. But weather was the biggest factor.

Of those reporting, 30 companies serving areas from Louisiana to eastern Massachusetts experienced their winter peak during the three-day cold spell that swept the eastern half of the nation Dec. 19-21.

Companies in the Pacific Northwest almost universally reported their winter peak as having come more than a month ahead of schedule because of a cold spell Nov. 14-15. In the Washington Water Power Co area tempera-

Sets Record for Utility Industry

tures on Nov. 15 fell to a minimum of 11 degrees below zero and never went above 12F. As a rule utilities in this area get their peak load during January with a secondary peak usually before Christmas. But this year the November cold snap brought loads that exceeded even the expected January level.

Illustrative of the experience of companies in the Northwest was that of Portland General Electric Co. It experienced a November peak of 741,000 kw against an estimate of 636,000 kw for the same month. Up to Dec. 28 the company's December peak had reached 701,000 kw against an estimate for the month of 660,000 kw. Portland GE attributes disparity in estimated and actual load to high appliance sales saturation in 1955 plus the coldest November on record. The company's residential kilowatt hour usage ran 12% ahead of a year ago.

Among the other systems expecting a January peak is TVA. To Dec. 29 the TVA system had experienced a winter peak of 8,298,000 kw, an increase of 31% over the same period last year. In January the TVA expects a peak of 8,450,000 kw "less any load curtailment."

The effect of increased industrial and commercial activity was clear in the comments of some of the responding companies:

Cleveland Electric Illuminating Co reported industrial load high probably because of last minute orders in small plants. Load on the peak day (12/19) was near peak all day and into the evening. Automotive industry load was high.

West Penn Elect System Christmas lighting was about normal with industry at peak levels and temperature for the month of December far below last year.

On the Ohio Edison System industrial kwhr sales for the 12 months ended Nov. 30 were up 23.6% over the same period last year.

Duquesne Light Co reported its highest kwhr send-out for a December day to be 15.5% higher than its top send-out in 1954.

Commonwealth Edison Co spokesman said that except for two abnormal war years 1955 was the first year that the company's summer peak ever exceeded the previous winter peak. Edison's summer peak this year was 3,320,000 kw; its 1954 winter peak 3,284,000 kw.

Detroit Edison's actual December peak was 12,000 kw below estimate. One large industrial customer (70,000 kw) shut down for reasons of his own on the date of the 1955 system peak. Consequently, a higher peak, up to or above the estimate is expected before the season is over.

Democrats Name Power Among Top Issues For '56

Power has been listed by the Democratic National Committee as one of the "ten top issues for 1956" in the January issue of Democratic Digest, official party monthly.

Excluding foreign policy differences, the issues were set down as follows in the Digest: "Falling farm income, tax favoritism for the rich, the public power giveaway, favoritism to big business, misconduct in government, the rising cost of living, small business failures, GOP anti-labor policy, the school crisis, and the growth of monopolies."

The committee stated that the list had resulted from a nationwide poll of party leaders "to determine what the people consider the paramount questions of the day."

San Diego G&E to Expand

Addition of a 100,000-kw, $13-million generating unit is being planned by San Diego Gas & Electric Co for its Encina plant, Carlsbad, Calif. Present plant capacity is 100,000 kw.

Watt's in These Electric Bulbs?

Discarded light bulbs, unlike empty pop bottles which can yield up to a 5¢ return, can be a problem. But not to Robert Seabright of Long Beach, Calif., who has found a good use for them.

Seabright, a man of infinite patience, installs miniature reproductions of scenes and people within old light bulbs. He now has over 400 of these decorated bulbs, including everything from a miniature church to a sailing vessel.

"Folks always have a hard time figuring out how I get so many things inside a bulb," says Seabright. He explains that by soldering one half of a pin to the end of a long thin wire he has produced a gimmick which allows him to maneuver even the tiniest object. His creations are housed in anything from a small flash bulb to big 1,000-watt bulbs.

POWER LINES were casualties when flood waters and high winds uprooted trees in Soquel on Soquel Creek near Santa Cruz, Calif.

MAP SHOWS northern California where flood waters drained into Pacific Ocean and central valley. Numerous dike breaks occurred in north coastal areas. Utility damages ran into millions of dollars.

Floods Cripple PG&E Service Area

Hard hit by recent floods which struck western Oregon and northern California was Pacific Gas & Electric Co which reported heaviest damage to distribution lines caused by falling trees. High winds also caused wires to touch and short out, the company said.

At flood peak, eight hydro powerhouses on California rivers were out, about half of them flooded. And PG&E reported that many of its substations had been flooded out.

Sacramento Municipal Utility District also reported considerable damage from high winds which felled trees over power lines.

TRAFFIC on this resort road in Guerneville was restricted to boats only as heavy rains and winds caused Russian River crest to swell to 47.9 ft, nearly 19 ft above flood stage.

KLAMATH RIVER flood waters race through business district of Klamath, where over 500 people were evacuated. Parts of town were under 15 ft of water. Klamath was one of 8 towns completely flooded.

Memphis Pushes Plan to Supply Own Power

Memphis city officials met with representatives of eight financial houses late in December to discuss financing of its proposed 750,000-kw, $140-million steam plant.

This represents an expenditure of $40 million over original estimates of the cost of a 500,000 to 600,000-kw plant.

Instead of striking off on a separate course in the power field, Memphis plans to stick with Tennessee Valley Authority and the other TVA cities as "closely as possible", it says.

When construction is well underway, there is a strong possibility, the city adds, it may request that TVA buy all its power at "a fair figure" and supply Memphis from TVA's power pool.

Demand Growth Considered

Facts in support of these conclusions were collected in a series of interviews in Memphis with members of present and new city administrations; engineers; light, gas, and water commission executives; and industrial development leaders.

The plant that Memphis' Board of Light, Gas, and Water Commissioners is likely to approve will be the same size as that at New Johnsonville.

Its 750,000-kw capacity is equal to the annual increment of power supply TVA board members say will be necessary to meet demand growth in the system as a whole.

Memphis LG&W Division engineers said a new plant of the proposed size would be necessary every three or four years to meet the demands of Memphis' growth.

City's Power Future Probed

Edmund Orgill, mayor, and three city officials agreed on the following points bearing on the future of Memphis' power system:

1. Memphis will remain a TVA supporter, and is a proponent of the self-financing plan.

2. Memphis will not attempt to use its freedom from TVA supervision over its power rate structure so its electric system can act as a tax collecting agency for the city government.

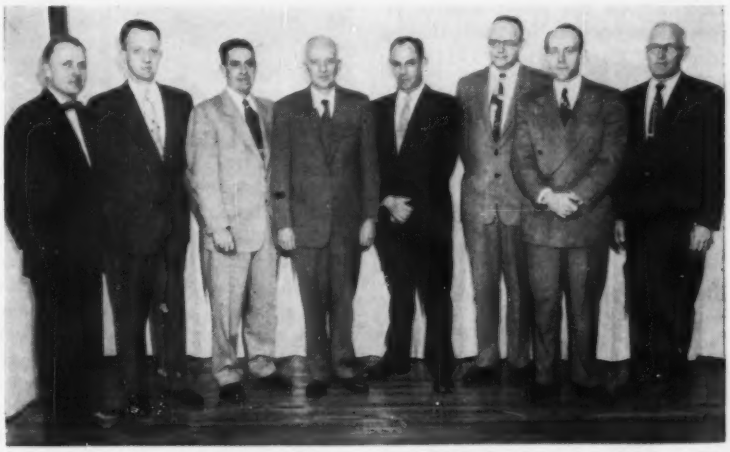
3. Neither will it, as suggested by TVA Board Chairman Herbert D. Vogel, use this new ability to fix its rates independently to offer special low rates to lure heavy power-using new industry into the area.

4. Construction of the new plant to supply plenty of power at the existing rate is the power system's goal.

With a 15% surcharge for industrial and commercial consumers and a standard yardstick rate for residential consumers, Memphis already has one of the highest rate structures of the TVA area.

Preliminary surveys of Burns & Roe, New York, the city's consulting engineers, have indicated the necessity of the larger steam plant installation so strongly that the city has taken an option from Westinghouse Electric Corp on three 250,000-kw generators.

These surveys were based on the projection of recent increases in Memphis' demand for power, which runs from 25% to 30% a year. The city now has a peak power demand of around 390,000 kw, lower than Nashville or Chattanooga.



NEW OFFICERS and directors of IPC are (l to r) T. C. Roe, retiring chairman and new board member; H. W. Memmott, director; Lester C. Roe, director; Dean W. Taylor, chairman; S. L. Chapin, vice chairman; H. H. Loomis, director; A. E. LaPlante, director; and A. L. Lawton, secretary-treasurer.

Leasing Equipment Lauded at IPC Meet

The industrial trend toward leasing machinery and office equipment is helping utilities sell more electric power. B. D. Kelts, Horton Equipment Corp, Hartford, told the Interstate Power Club in New York that many manufacturers are leasing when they cannot buy equipment outright.

He cited as an outstanding advantage the fact that large amounts of capital are freed by a lease and can be put to profitable use. A $5,000 piece of equipment, for instance, depreciated $1,000 per year for five years, ties up $4,000 of working capital during its first year. Under a lease, the company would pay for the use of the machine, plus a service charge.

The trend is epitomized by a top-notch electronics manufacturer situated near Boston. This company leases everything. It leases land, building, lighting, machinery, lockers, fire extinguishers, and typewriters. It even leases labor.

It would have cost $250,000 to air condition this plant. Top management vetoed the idea. But air conditioning went into the plant—under a lease. And as a competitive by-product, a neighboring manufacturer immediately air conditioned his engineering rooms to keep engineers from switching jobs.

Robert E. Ginna, executive vice-president of Rochester Gas & Electric Corp, spoke on "Your Stake in Public and Private Power," and Walter Johnson, Jr, vice-president of American Airlines, addressed the club on "Inspirational Selling."

New officers and directors also were elected at the meeting (see photo).

NW Power Demand

. . . will exceed supply in ten years by 2-million kw, utilities conference unit forecasts

Demand for power in the Pacific Northwest will exceed supply by 2,000,000 kw in ten years, the Pacific Northwest Utilities Conference Committee predicted at a recent Tacoma, Wash., meeting after receiving reports from 17 public, private, and federal producers of electrical energy.

The forecast, as released by C. A. Erdahl of Tacoma, committee chairman, expects the power load to increase 5½ % a year, from an estimated load of 7,250,000 kw in 1956-57 to 12,250,000 kw in 1966-67.

Erdahl said he believes the demand estimate to be "unusually conservative" and that the estimated output of 10,000,000 kw by 1967 will hold good only if 15 hydroelectric projects now under construction or projected are built according to schedule.

Short Federal Funds Noted

The report noted that federal appropriations for power projects in the Northwest have been about $150 million annually, while the demand for power requires that at least $250 million to $300 million be invested each year during the next decade.

Unless more power generation is created, a serious unbalance of demand to supply will develop by 1963 and grow steadily worse, Erdahl said.

Additional hydroelectric generation is expected from the following dams during the next decade: Chandler, Ross, and McNary, 1956; Roza, Pelton, and Chief Joseph, 1958; Mayfield, 1960; Hills Creek and Ice Harbor, 1961; Mossyrock and Priest Rapids-Wanapum, 1962.

Study Was Joint Effort

The power study was prepared by a committee headed by M. L. Blair of Washington Water Power Co, Spokane. Serving with him were H. M. McIntyre, Bonneville Power Administration; W. J. Olson, Seattle City Light; V. B. Jones, Tacoma City Light; A. J. Porter, Portland General Electric Co; L. B. Cowgill, coordinating group of the Northwest Power Pool; J. S. Dickson, Northwest Public Power Assn; E. L. Bayles, Pacific Power & Light Co; and C. F. Munson, Puget Sound Power & Light Co.

AP&L Local Offices Get New Look

Three Arkansas Power & Light local offices—Camden, Sheridan, and Dermott—will soon feature a new look in office design which is eventually planned to standardize AP&L offices throughout the state.

Camden office (above), now under construction and scheduled for completion within a few months, will be equipped with the latest model heat pump, modern lighting fixtures, and a drive-in window (right) for customers' convenience in paying electric service bills. The new design, including newly approved electric exterior sign, will be used whenever an office is built or modernized.

Construction of another AP&L office building at Little Rock has been postponed until the Arkansas Public Service Commission passes on the company's applications for a $5.2-million a year rate increase. The Little Rock building, as planned, will be three stories high and will cost an estimated $1.5 million.

POWER BRIEFS

• Avon power plant on Lake Erie is the site for Cleveland Electric Illuminating Co's new 250,000-kw, $38-million turbogenerator. When the unit goes into operation in 1958, the Avon plant will have a generating capability of 670,000 kw, making it CEI system's largest plant. Site was selected "in the interest of industrial dispersion and national defense," according to President Elmer L. Lindseth.

• As part of its $2-million expansion program, Gates Rubber Co, Denver, is installing a 5,000-kw gas turbogenerator, the first of its type to be installed in a rubber plant.

• Negotiations towards construction of a $500-million, 2,700,000-kw hydro project at Moran on the Fraser River in British Columbia by the Moran Power Development Co have been disclosed by provincial officials. The project's dam, which would rank with the world's largest, would rise 720 ft and create a lake extending 165 mi north towards Quesnel.

• Alabama Power Co, subsidiary of Southern Co, has filed application with Alabama Public Service Commission and Federal Power Commission for a license to build four new dams on the Coosa River and to raise the height of Lay Dam by 14 ft. The four dams, to add 346,700 kw to the utility's generating capacity, will be located at sites referred to as Leesburg Dam, Cherokee County; Lock 3 Dam, St. Clair and Calhoun Counties; Kelly Creek Dam, St. Clair and Talladega Counties; and Wetumpka Dam, Elmore County. Construction for the first dam of the $131.5-million project is scheduled to begin late next year.

TVA Campaigns for More Steam Plants

. . . in annual report which forecasts 500,000-kw deficiency in capacity by 1958 unless Congress votes money for expansion

The Tennessee Valley Authority is campaigning again for new steam plants. In its annual report, released on New Year's day, the agency declared its system faces a deficiency of 500,000 kw of capacity in 1958 unless Congress votes the authority money to go ahead with more expansion.

"Generating facilities now under construction will provide modest margins over peak demands through calendar 1956," the report said. "Unless new construction is begun promptly, these margins will disappear in 1957 and a deficiency of 500,000 kw is possible late in 1958.

Plan Based on Prompt Action

"This presumes that the new generating plant planned by the city of Memphis (to replace the abandoned 600,000-kw Dixon-Yates project) will be built in time to take care of all its requirements and that only nominal increases will occur in the use of power by the extensive federal defense installations served by TVA (chiefly the Atomic Energy Commission)."

TVA has tried unsuccessfully for more than three years to obtain money and permission to construct new steam plants.

Before Eisenhower Administration took office, these desires were wrapped up in plans for a new 400,000-kw facility at Fulton, Tenn. Congress at that time refused to grant the necessary funds for construction, and Eisenhower, on taking office, deleted the item from TVA's budget. As a substitute measure, Eisenhower's staff negotiated a contract with the private Dixon-Yates firm, Mississippi Valley Generating Co, for 600,000 kw in new steam capacity to be channeled into the TVA system. This later was cancelled when Memphis announced it would build a municipal plant to supply its own needs in 1958.

TVA reported it added more than 1.7-million kw to its system in the fiscal year ended June 30, 1955. This brought total installed capacity to 7,810,000 kw at that time (it had grown to about 9-million kw by the end of calendar 1955).

Most of the increased capacity was installed in 11 steam plants, but there were new units being installed in hydro dams, too. Transmission lines were boosted by 588 miles.

The system generated 42.5-billion kwhr and obtained 3.6-billion kwhr by purchase and exchange. (TVA's system is integrated with private power companies and municipals in the area.)

Sales to Federal Agencies Up

Sales to federal agencies, chiefly AEC, totaled 21.8-billion kwhr, a rise of 10 billion over fiscal 1954. This represented 52% of total TVA sales. The rest was split among cities and rural cooperatives (13.6-billion kwhr) and large industries (6-billion kwhr).

Gross power revenues were $188.2 million, a 40% rise over fiscal 1954. Expenses ran about $140 million, leaving a net revenue of $47.9 million. TVA pays no federal taxes.

New demand is estimated at 750,000 kw a year.

Demand for Fossil Fuels Seen Continuing

"The future of fossil fuels (coal, gas and oil) seems safe" in the coming atomic age, U. S. Sen Clinton P. Anderson (D-N.M.), chairman of the Senate-House Atomic Energy Committee, told the Economics Club of Chicago recently.

Anderson predicted the "future will know three sources of energy: the energy of fossil fuels—meaning coal, gas and oil; the energy of fission from uranium; and the energy of fusion from the lighter elements such as deuterium; and there need be no competition between these types of energy."

He pointed out, "We have 58 million automobiles in America today. We are likely to have 80 million within another generation. The gasoline and lubricating oil requirements of these 80 million automobiles will take every barrel of oil in the wells already discovered and permit all our oil sands to be completely exhausted long before any satisfactory process of using atomic energy in a private automobile is developed. So the future of fossil fuels seems safe."

Anderson said "there are many ways in which atomic energy promises to supply wealth to the industries and the industrious of this nation.

"First of all, consider atomic power itself. Only a few days ago the investment bankers, meeting in Florida, were told that the investor-owned electric industry was now planning atomic projects that would require a capital investment of $225 million.

"If I may add my own footnote, that is but a tiny drop in the atomic energy bucket. Already the government of the United States has invested $13 or $14 billions in studies, research, experiments, and operation of our atomic power and nuclear energy program. True, we have spent much of it in bombs; but I still include the military figures because for security reasons they are not separable from the overall expenditures and because I feel our stockpile of nuclear components for atomic weapons would have enormous commercial value for the generation of power even if some day the use of atomic weapons was banned everywhere in the world.

"Uranium in the stockpile does not deteriorate rapidly," he said. "It's good for a thousand years. Further, the figure of a quarter billion dollars does not include the expanding uranium industry with its mines, mills, and storage depots.

"But the figures given the investment banking association indicate that atomic project employment had reached 140,000 persons—6,000 working directly for the Atomic Energy Commission, 60,000 in construction, and 75,000 in operation of nuclear projects. Yes, the atomic industry is big in its own right, but it is far bigger in what it could contribute to the wealth of our nation."

How voters got the facts, and why at the polls . . .

Stevens County Turned Out PUD

In Stevens County, Wash., private power was chosen over public power by a whopping 72% majority. Now the ballot boxes are put away, the campaigners are resting, and the story that may become a legend is being retold. In reviewing this election, in which the only issue was private or public power, Washington Water Power Co believes two factors were responsible for its being selected over Public Utility District No. 1 of Stevens County:

1. A genuine citizens' movement to get rid of the PUD.

2. Dogged, relentless, door-to-door campaigning to meet every voter and tell him the story.

Two citizens and voters of Stevens County spearheaded the move to oust the utility district. One was Jean L. Charbonnel, a one time bonding insurance inspector. His investigations into the financial obligations of the PUD spurred the public demand for a vote on WWP or PUD service. The other was an energetic young farmer, Ernest R. H. Sackman. He led the committee that forced the issue.

Once the special election was scheduled, 17 of Water Power's regular employees went to Stevens County to make house-to-house calls on every one of the 9,690 registered voters. For weeks before they began electioneering, WWP representatives urged voters to register properly.

Foundation for the election was laid in November 1929 when American Power & Light Co bought Stevens County Power & Light Co and turned over its operation to WWP. Two years later WWP acquired the Stevens stock. But in those depression years WWP could ill afford costly service extensions in rural areas where hard-pressed farmers used little electricity.

Co-op Formed in 1936

A rural electric cooperative was formed in 1936 to serve most rural customers in Stevens County. It had 1,200 miles of line and 2,400 consumers. To consolidate electric service of the entire county with the hope of gaining lower rates eventually, Stevens County voters formed a PUD. It is reported many citizens have been irate about that action ever since. Some maintain they had little voice in deciding to establish the utility district.

Failing in 1948 to raise $2.5 million to buy WWP properties in the county, the PUD turned about and took over the cooperative in 1952. It promptly refinanced the 40-year 2% REA loan with a shorter term loan at 4½%. This added $51,000 annually in interest alone to the taxpayers' debt for public power.

This, to Charbonnel, was beyond understanding. He began a careful inquiry into PUD finances. He found "the people of Stevens County have taken on a perpetual debt." Charbonnel began suggesting publicly that the county would be better off by getting rid of its public utility district.

Charbonnel published a pamphlet "The $164,000 question." WWP reported in its 1954 annual statement filed with the state that it paid $1,750 to print 5,000 pamphlets, then in wide distribution in the county. Looking back, PUD President Joseph Garvey comments, "When we saw that financial report, we knew we were in it."

Up to this point, the PUD commissioners felt they were dealing only with a group of disgruntled customers. Suddenly they were confronted with a cohesive movement. The PUD was in the midst of a new condemnation suit,

filed early in 1953, against WWP properties. The commissioners sat tight, hoping the courts would act faster than the citizens.

But Charbonnel's small committee fused into a new, large group—the Citizens Power Vote Committee—with Sackman as leader. He set up an office in the kitchen of WWP's Colville office and began organizing a campaign to compel something never before done in Washington State—a chance for citizens to vote on private or public electric service.

Sackman and WWP both acknowledge there were conferences between them by this time. But both deny that WWP took a part in forcing the vote beyond giving Sackman office space and publishing Charbonnel's pamphlet.

Meeting Gained With PUD

Without success, Sackman tried to meet with the three PUD commissioners. Twice they adjourned meetings when Sackman and his committee went to the PUD building. In a third try, Sackman and helpers telephoned their supporters early on an August morning, met at city hall, and marched 150 strong on the PUD office. The commissioners heard them out, as the crowd overflowed onto the office lawn, catcalled and disputed through the noon hour.

After two more peaceable meetings with Sackman and Eugene West, his principal assistant, the PUD commissioners agreed to accept a WWP bid on their properties and set an election date. The bid was $2,905,000, and the election date, Tuesday, Nov. 22.

Once the date was set, Washington Water Power deployed to make sure the private power story would be well presented. There was, Pres Kinsey M. Robinson said, too much prestige at stake in the election. In recent years, WWP had lost properties by condemnation to PUD's in Chelan, Okanogan, and Pend Oreille Counties. Here was a first chance to turn the public power advance.

Story Taken to Voters

Kenneth D. McCord, a WWP public relations man from Spokane, went to Colville to direct the campaign on the spot. "We decided from the start that we would rely on the truth," says McCord. "Every claim we made in the campaign, we could prove. We decided we could not afford to lose. We would concentrate on getting our story —personally—to every voter in Stevens County."

McCord dropped his briefcase on a desk in Colville eight weeks before the election was scheduled. Sixteen other WWP employees had been detailed to help, leaving their regular jobs for the campaign. The 1953 Washington legislature had revised voting laws. To be sure none of their votes could be challenged, WWP workers spent the first two weeks checking every registration in the county. They made sure every voter was properly registered in the right precinct.

Door-to-door Campaign Begins

Then the door-to-door campaign began, over the muddy, snow-clogged roads of an early, tenacious winter. WWP men handed out Reddy Kilowatt pins and cookie cutters, even some Reddy Kilowatt handcream. Among pamphlets distributed by them, the most telling was a reprint (with comment) of the 1930 Public Utility District laws. This pointed out in detail the powers of a PUD.

"If a WWP representative found a voter he felt was opposed to the company," Sackman explains, "we sent around someone from the power vote committee to discuss the issue as a friend and neighbor."

Grange Enters Picture

Sensing danger to public power which it has long supported, the Washington State Grange entered the campaign. At least three deputy masters from western Washington counties began their own door-to-door campaign in Stevens County. They distributed a four-page pamphlet that pointed out the PUD accomplishments: 160 line extensions built in three years; contracts "for Grand Coulee power for 20 years ahead;" and "meeting all financial obligations and a good credit rating." Attacking a vote for private power as a "sell out," the pamphlets argued that citizens might give up local control. They warned that "Washington Water Power Co raised rates in 1953. There is no assurance it won't happen again."

To match the power vote committee, public power proponents formed the Stevens County Development League. It was "dedicated to promoting the economic welfare of the county, through local control and local ownership." Both the power vote committee and the development league held about 12 public meetings to debate the power question. The pattern in each meeting was the same. Charbonnel, with his acute understanding of PUD financing, chipped at the PUD story. Each side attended the other's meetings to object, confuse, and confound.

Ken McCord's office staff wrote letters to every registered voter. They posted billboards, passed out auto bumper placards, handed out pamphlets. PUD President Garvey, who says "the Grange was the backbone of our fight," reports that closed meetings in the county's 18 Granges devoted many lectures to the power issue, urging support of the PUD.

Funds Solicited

Sackman's committee solicited funds from 30 industries, some as far afield as Idaho. It found all of them "willing to contribute from $25 to $200." However, the committee spent "less than a thousand dollars in the campaign," says Sackman.

Just how much money was spent, nobody will say. It is estimated at "thousands of dollars on both sides." It came from a number of sources. WWP ran a series of 5x18 ads in the two weekly papers, the Chewelah Independent and the Colville Statesman-Examiner. Some explained how much tax money WWP paid into the county. They estimated Stevens County would gain $25,000 in taxes with WWP serving the entire county.

"One of our most effective ads," says McCord, "was the testimonial type. Various people agreed that we could use their pictures and a statement from them supporting WWP. When voters saw where their neighbors stood on the question, it helped a lot."

Advertising Compared

The PUD countered with newspaper ads calling attention to WWP's 1953 rate increase, charging that WWP was spending $3,000 a week on the campaign. McCord believes the amount of newspaper advertising space purchased by each side was about equal. The PUD ran some larger ads than WWP, including a final full-page appeal, but space totaled about the same.

Ten days before the election, a daytime local radio station KCVL opened in Colville, the county seat. For its first ten days, the station played almost nothing but records and WWP or PUD announcements. WWP used spoken testimonials by

citizens in their own voices supporting sale of the PUD property. The PUD recorded announcements much on the theme of their newspaper ads. Some of these were done by Ken Billington, executive secretary of Washington State PUD Association. He was on the scene in Stevens County during most of the campaign. Because it was first with contracts, WWP got most of KCVL's radio time.

One of WWP's most effective arguments initially was a mimeographed sheet comparing WWP and PUD rates —the PUD rates were about double. But in mid-August the PUD announced it would match WWP rates. Public announcements by leading figures in Stevens County began popping about a month before the election. The mayor of Northport, served by the PUD, said his community would form a municipal system if the PUD won. In Chewelah, served by WWP, the mayor said a PUD victory would increase power costs to his town by about $12,000 annually.

WWP Pres Robinson issued a public statement charging that "reliable financial analysts think the Stevens County PUD is nearly broke." John Aston, a PUD commissioner, wrote Sackman a public letter. He charged the other commissioners had misled him, that the PUD would require a bigger debt than advertised to buy out WWP, and that chances of long-term power were better under WWP service.

Three public meetings were held by WWP and two by the PUD. Robinson spoke at Colville and Chewelah the week before the election. He promised continued low rates and quick extensions to the few remaining Stevens County farmers still using oil lamps. State Senator John H. Happy dwelt on tax benefits: "WWP paid $28,767 toward the schools in Stevens County in 1954, compared to $2,082 contributed by the PUD."

PUD Steps Up Campaign

The PUD was represented by Wilfred Woods, publisher of the Wenatchee Daily World newspaper, and former U. S. Senator C. C. Dill. Woods traced the statewide trend of PUD's toward lower rates and extended lines. Dill dwelt on the "big business' aspect of WWP.

Late in the campaign the PUD tried two final splurges. At Grange meetings, it handed out cardboard placards reading "Vote No, Nov. 22". The PUD urged that these be posted in a sudden county-wide blossoming a day or two before the election. But by and large the coverage was spotty.

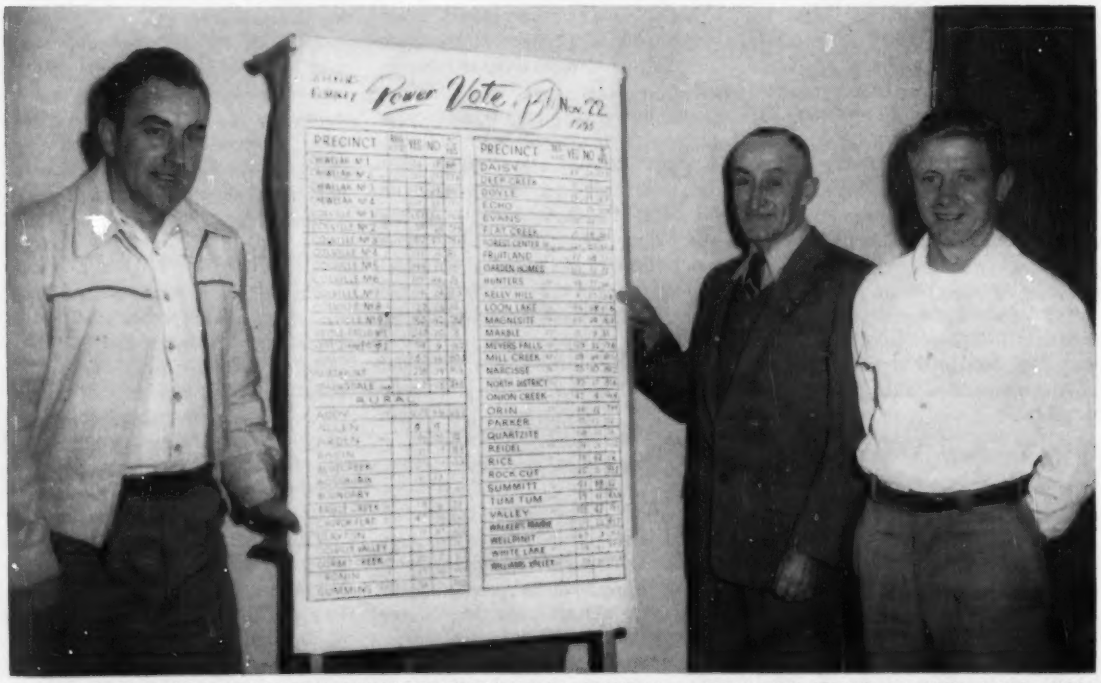
The PUD sent out a letter frankly acknowledging its need for 1,000 names for a testimonial advertisement. "If we can get 1,000 names in the ad, we probably will win the election," PUD commissioners said. The ad drew less than 800 names and thus forecast the election results. The PUD sent personal letters to school administrators and teachers attempting to show that the "same people who oppose school money oppose the PUD." It sent letters to businessmen asking them to support the rural people, whom they (the PUD) believed favored the PUD.

On Nov. 22 about 75% of the voters went to the polls. When the votes were counted, about 72% favored purchase by Washington Water Power. The company won 59 of 64 precincts. What were the basic factors in the election? McCord thinks these brought the WWP victory:

1. PUD acquisition of the cooperative, which was paying its way and providing satisfactory service. As a result of refinancing, the PUD's financial ability was in doubt.

2. Superior WWP service.

3. Unquestioned WWP financial ability, including higher tax payments to the county and lower rates than charged by the PUD.



LEADERS OF CITIZENS POWER VOTE COMMITTEE TOTAL UP 5-2 VICTORY, LARGELY THE RESULT OF THEIR HARD WORK

Shielding 13.8-Kv Distribution Cuts Outage Time 47%

13.8-KV LINE of 4/0 tree wire with shield on additional pole height in foreground and on bayonet at the second pole

MORRIS G. WEST, Engineer, Distribution Dept, New Orleans Public Service Inc, New Orleans, La.

Shielding of 13.8-kv distribution lines with the secondary neutral has greatly improved service continuity to New Orleans Public Service, Inc, customers. With only 54% of the system shielded, outage time has been reduced by 47%. This cut resulted primarily from a 74% drop in lightning outages and a 63% drop in wires down. Other benefits gained from shielding are reduced operating costs, increased revenue, and more favorable public relations.

The company operates in an area that averages 70 thunderstorms yearly. It started installing 13.8-kv distribution without shielding in 1943 and converting older 4-kv lines, where necessary, in 1944. Going to the higher voltage raised the distribution lines above the surrounding shielding, increased the fault currents, and increased individual feeder exposure. Exposure continued to increase until a severe storm, involving 1,288 cases of trouble, forced the adoption of better protection methods.

An old two-circuit line located in an area particularly vulnerable to lightning was the first to be shielded, covering 65% of one circuit and 35% of the other. A ⅜-in. copper-clad ground wire was mounted on a bayonet 4 ft above the conductors to form a shielding angle of 45 deg. During the subsequent six months four other circuits on adjacent streets continued tripping during storms. But the circuit with 65% shielding had no outages, and the other had only three momentary outages.

Ideal grounding conditions undoubtedly contributed to this experience. The system neutral of No. 2 H.D. copper is grounded at every third pole, and forms a grounded network throughout the urban area. Earth resistance is about 20 meter ohms. Tests made on one ⅝-, 8-ft long, copper-clad ground rod gave results averaging 5 ohms with a maximum of 10 ohms. These values are reduced to 0.15 ohms when the No. 2 H.D. copper ground network is included.

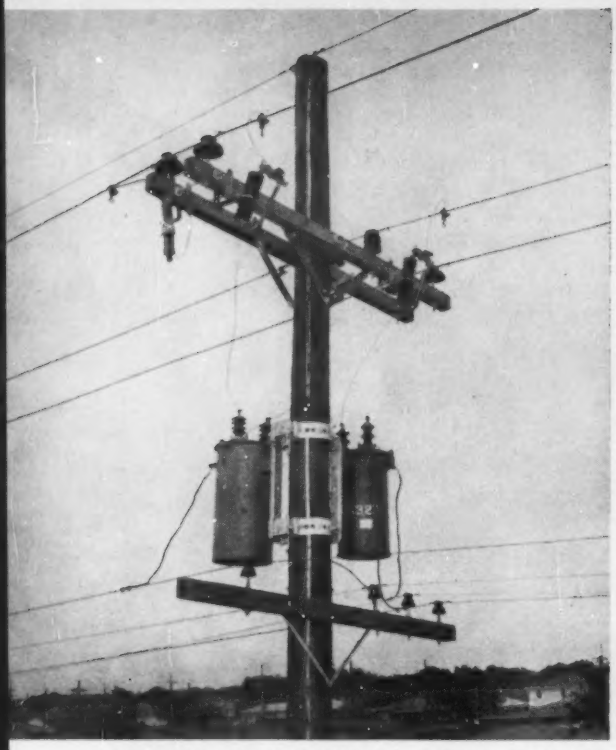
Two more circuits were shielded in 1952. This time the system neutral was relocated from the secondary level to a bracket on top of a bayonet, again 4 ft above the primary to provide a 45-deg shielding angle. The ground lead, attached with two connectors to the shield, was run down the pole, under molding from the primary zone to the driven ground.

Relocating the system neutral increased the secondary-to-neutral impedance from 0.195 to 0.230 ohms per 1,000 ft. However, this does not produce a major change in regulation if the wire is at least No. 2 copper.

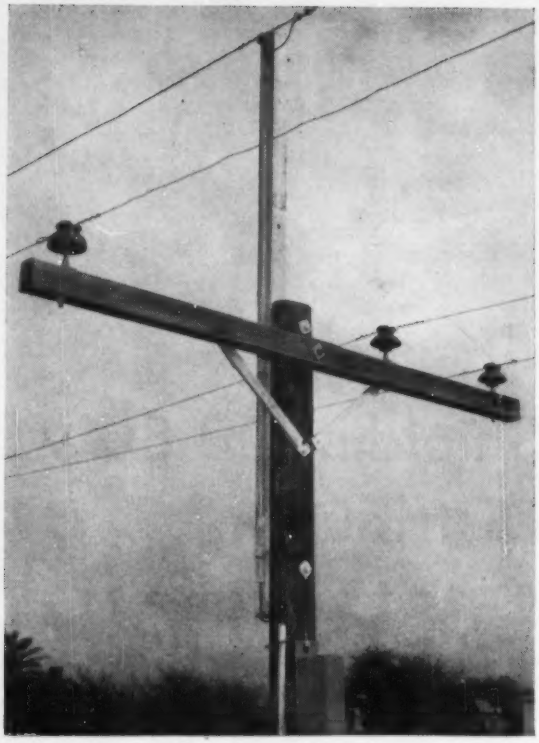
Experience with these shielded circuits justified the start of a definite shielding program in 1953. Between 30 and 36 miles of existing 13.8-kv lines are being shielded yearly. A typical year of shielding would amount to approximately 65 miles including new extensions, conversion of 4 to 7.6 kv and the shielding program. The 13.8-kv system is now 54% shielded.

The shielding program for older lines consists of raising the system neutral—a tedious job requiring about eight manhours per pole. On a two-circuit pole line the work is performed with at least one circuit "dead." Sin-

Adapted from a paper presented at the Southeastern Electric Exchange Engineering & Operation Section meeting in Charlotte, N. C.



TRANSFORMER INSTALLATION has a No. 2 shield wire supported on additional pole height. Note cluster mounting



SINGLE 13.8-KV CIRCUIT has No. 6 conductors and No. 2 shield supported on 9-ft bayonet on the older pole lines

gle circuit lines are worked "hot" where outages cannot be obtained, except when working around equipment. Single-phase extension are shielded hot, except over transformers.

Wood crossarm braces are used to provide 18-in. of additional wood (50 kv per ft) between the phase and ground, down the pole. Insulators are the same as before: 23-kv insulators (80-55 kv) on 4/0 trunks and 17.5 kv (60-40 kv) in distribution areas.

Ground rods, ⅝-in. by 8-ft, copper-clad, are installed at each pole except corners. Valve arrestors are installed to protect against high transient voltages caused by either coupling or induced strokes and to minimize damaging follow currents.

When constructing new pole lines or replacing old poles, cost and appearance favor poles of 5 ft additional height to avoid using bayonets.

Cost to shield older lines is greater than for new installations. In 1954 older 13.8 kv lines were shielded at an average cost per mile of $1,800 and 411 manhours. This adds roughly 10% to the line cost but provides a side benefit of reduced maintenance.

Since the shielding program was

Table I—Number of 13.8 kv Interruptions Before Shielding

19 Circuits—260 Miles of line
Aug. 1, 1951 to Aug. 1, 1952

Cause	Momentary*	Prolonged**	Total	% of Total
Lightning	188	2	190	59.4
Wire Down	15	32	47	14.7
Defective Equipment	9	9	18	5.6
Underground Failure	...	5	5	1.6
Ordered Out	17	7	24	7.5
Miscellaneous	11	7	18	5.6
Unknown	14	4	18	5.6
Totals	**254**	**66**	**320**	**100.0**

Table II—Number of 13.8 kv Interruptions After Shielding

29 Circuits—383 Miles of Line
Aug. 1, 1954 to Aug. 1, 1955

Cause	Momentary*	Prolonged**	Total	% of Total
Lightning	71	5	76	36.0
Wire Down	8	19	27	12.8
Defective Equipment	2	4	6	2.8
Underground Failure	0	12	12	5.6
Ordered Out	15	4	19	9.0
Miscellaneous	23	20	43	20.6
Unknown	21	3	24	11.4
Insulator Flashover	4	0	4	1.8
Totals	**144**	**67**	**211**	**100.0**

* Momentary interruptions include outages lasting from a few cycles for automatic circuit breakers to a minute for manually operated breakers.
** Prolonged outages were longer than one minute.

started, the number of interruptions on the 13.8-kv system has continuously decreased—from 320 during the Aug. 1, 1951 to Aug. 1, 1952 period (19 circuits—260 miles) to 211 during the corresponding '54 to '55 period (29 circuits—383 miles). (See Tables I and II.)

Principal causes of the 320 outages were lightning and wires down (often from lightning). The two combined caused 1.2 outages per 100 miles per thunderstorm, Chart I. Now, with 54% of the 13-kv system shielded, these causes account for only 0.34 outages per 100 miles per year—a reduction of 74% from lightning and 63% from wires down.

Comparison of these outages for five unshielded feeders versus six progressively shielded feeders is shown in Chart II. Over the four-year period the unshielded feeders maintained a rate of nearly 1.00 outages per 100 miles per thunderstorm. However, as the other feeders were shielded, the rate dropped sharply from 1.02 to 0.09.

With one exception the preceding comparisons are for shielded circuits having valve arrestors. On that circuit, 3-miles long, the existing arrestors were left in place. Following shielding this circuit's performance was improved from 4.1 outages per 100 miles per thunderstorm during 1951-52 to 2.9 during 1953-1954 (unshielded portion added in 1955).

Side Benefits of Shielding

To evaluate properly the total affect of shielding and determine the other advantages, analyses were made of other causes of outages and of transformer and street-light relay failures. During the four-year period the outages due to causes other than lightning and wires down improved by 14%. This may not entirely result from the shielding program because improved construction and equipment also affect this category.

Transformer failures for the entire 13-kv system dropped from 0.04 to 0.004 failures per 1,000 units per thunderstorm. However, the failure rates during the four years are somewhat erratic, and further study will be needed to determine a trend.

Street-light relays will continue to be subjected to transient overvoltage even under shielding, but to a lesser extent. Failures per 1,000 units per thunderstorm decreased from 2.84 to 2.29—or 19%. Here again the rates are erratic, requiring further study.

Chart I – Outages from Lightning and Wires Down-13.8 kv System

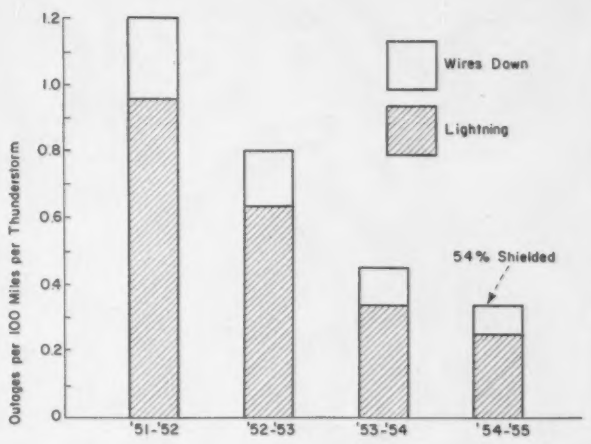


Chart II – Outages of Unshielded vs Shielded 13.8 kv Lines (Due to Lightning and Wires Down)

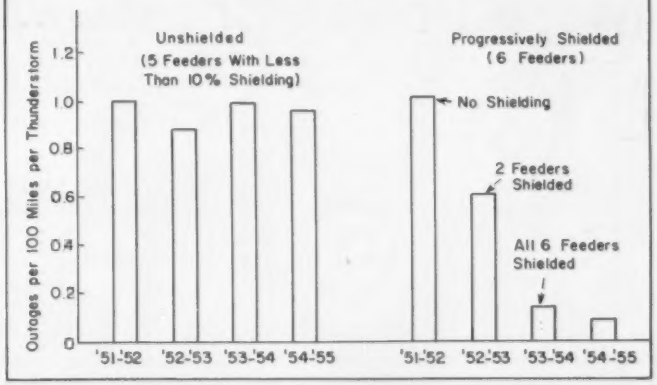
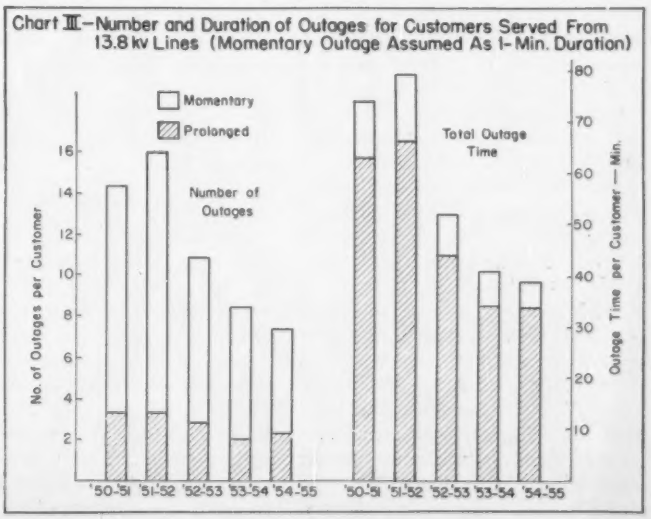
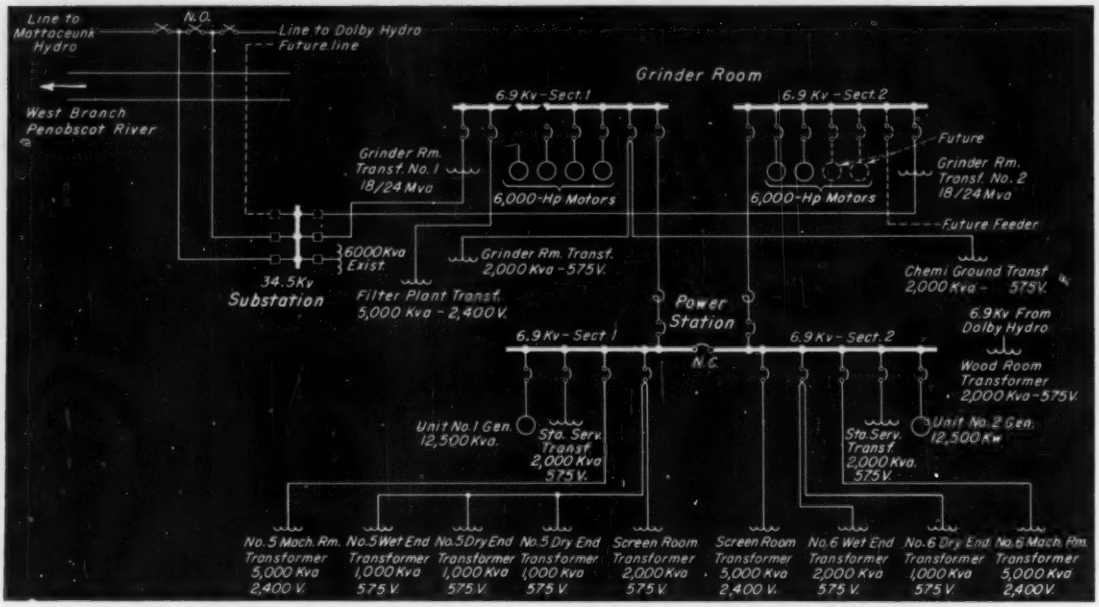


Chart III – Number and Duration of Outages for Customers Served From 13.8 kv Lines (Momentary Outage Assumed As 1-Min. Duration)




Line to Mattoceunk Hydro
N.O.
Line to Dolby Hydro
Future line
West Branch Penobscot River
Grinder Room
6.9 Kv - Sect. 1
6.9 Kv - Sect. 2
Future
Grinder Rm. Transf. No. 1 18/24 Mva
6,000-Hp Motors
6,000-Hp Motors
Grinder Rm. Transf. No. 2 18/24 Mva
Future Feeder
3 6000 Kva Exist
34.5 Kv Substation
Grinder Rm. Transf. 2,000 Kva - 575 V.
Filter Plant Transf. 5,000 Kva - 2,400 V.
Power Station
Chemi Ground Transf 2,000 Kva - 575 V.
6.9 Kv From Dolby Hydro
6.9 Kv - Sect 1
6.9 Kv - Sect. 2
N.C.
Wood Room Transformer 2,000 Kva - 575 V.
Unit No. 1 Gen. 12,500 Kva.
Sta. Serv. Transf. 2,000 Kva 575 V.
Sta. Serv. Transf. 2,000 Kva. 575 V.
Unit No. 2 Gen. 12,500 Kw
No. 5 Mach. Rm. Transformer 5,000 Kva 2,400 V.
No. 5 Wet End Transformer 1,000 Kva 575 V.
No. 5 Dry End Transformer 1,000 Kva 575 V.
No. 5 Dry End Transformer 1,000 Kva 575 V.
Screen Room Transformer 2,000 Kva 575 V.
Screen Room Transformer 5,000 Kva 2,400 V.
No. 6 Wet End Transformer 2,000 Kva 575 V.
No. 6 Dry End Transformer 1,000 Kva 575 V.
No. 6 Mach. Rm. Transformer 5,000 Kva 2,400 V.

BASIC SCHEME SHOWS HOW POWER IS SUPPLIED TO MILLINOCKET MILL, ME., OF THE GREAT NORTHERN PAPER CO

More Power Boosts Paper Output

INDUSTRIAL Design

To triple its newsprint production Maine paper company re-engineered its electrical distribution system for a 65,000-hp load

F. O. CHENEY, Electrical Engineer, Stone & Webster Engineering Corp, Boston, Mass.

To virtually triple the newsprint capacity of Great Northern Paper Co's mill at East Millinocket, Me., has required extensive re-engineering of its electrical distribution facilities.

The task of designing drives and controls for newsprint processing equipment fell to the company's own staff. Stone & Webster Engineering Corp designed and built the 2.4-kv and 575-v unit substations throughout the plant and their energy supply system. Substations and supply were planned to serve additional connected motor loads which, combined with building lighting loads, amount to about 65,000 hp.

At Millinocket a single day's production of paper more than 22 ft wide at 2,500 fpm would be enough to reach from the machines to Washington, D. C. To attain this production level, electrical design problems included:

1. Planning increased power sources, both hydro and fuel.
2. Deciding on optimum frequency.
3. Selecting cable for connecting main transformers with 34.5-kv substations.
4. Selecting relays.
5. Designing an underground system.
6. Simplifying unit substations.
7. Solving grounding problems.

Great Northern's hydro plants in the Millinocket area have a rated capacity of 140,000 hp and are reinforced by Diesel and steam generators. These are on the Penobscot River where the company owns about 60,000 hp in undeveloped power rights.

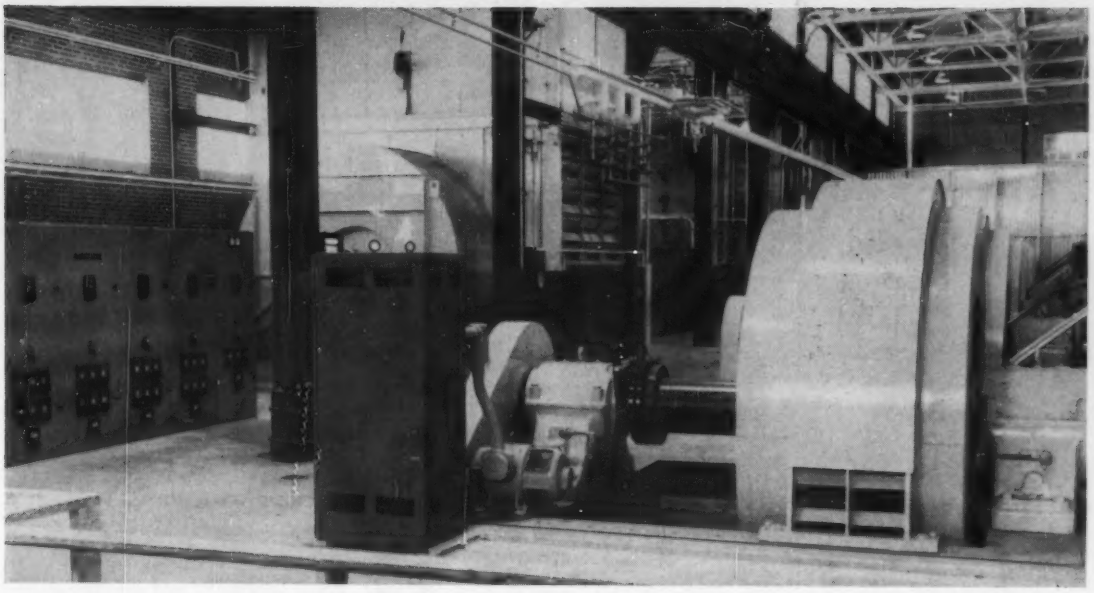
Tie-in Is Available

Company mills are served by 115, 34.5, and 6.9-kv transmission lines. In addition a tie-in with Bangor Hydro-Electric Co is available to the old mill. This tie can supply power for driving six synchronous grinder motors adaptable to reconnection for 60-cps operation at 2,100 hp each. Existing 34.5-kva transmission capacity, combined with that of two new steam turbine units at the mill, meets the requirements of the first two steps in the expansion program.

The new generating plant (1954) supplies both the electricity and the steam used in paper manufacturing. The first unit is a 12,500-kw, 6.9-kv, 0.8-pf, 40 cps hydrogen-cooled generator driven by a non-condensing extraction turbine with back-pressure governor. The second unit, planned for operation in 1956, will have an identical generator with extraction turbine and speed governor. Both have turbine throttle steam conditions of 1,250 psi and 855F and boilers rated at 300,000 lb per hr at 1,300 psi.

Earlier generation was at 40 cps. This frequency imposed a price penalty on equipment purchased for the steam station and mill. But, as it was obviously impractical to change to 60 cps, the lower frequency was retained. Frequency variation on the system seldom exceeds 0.5 cps.

Formerly a 34.5-kv substation with one oil circuit breaker provided a substantial part of power requirements to the old mill through three 2,000-kva, single-phase transformers with 6.9-kv secondaries. The incoming line was a single-circuit, steel-tower, river-cross-



MOTOR GRINDER ROOM FEATURES A 6,000-HP MACHINE WITH BELTED EXCITER, FIELD CUBICLE, AND CONTROLS

ing span tapped from a transmission line opposite the mill. This was supplemented by 6.9-kv wood-pole lines from nearby hydros.

Operates as Two Lines

A second river crossing, using wood structures, has been added. Disconnects sectionalize the transmission line at the tap point so that the transmission line operates as two lines into the substation bus. The existing 34.5-kv substation structure has been extended to accommodate two new breakers for the two lines and two for mill feeders. The breaker in the feeder circuit to the old 6,000-kva transformer bank remains in service. A breaker position is available for a third line. Main bus and connections are copper tubing, bus and structure being adaptable to further extension. This substation is normally controlled from the power plant.

Power directional relays protect the transmission lines. Main-bus, voltage-type, differential relays, operated from the bushing transformers on the oil circuit breakers, allow for future circuits to the bus with minimal changes in relay connections and adjustments.

For power station generation and distribution 13.8 and 6.9 kv were compared. Switchgear economies were realizable at the higher voltage. But the cost of several 6,000-hp, slow-speed, synchronous motors for driving large groups of pulp grinding equipment would have been 20% higher than at 6.9 kv. The cost difference of such motors exceeded any possible saving at 13.8 kv. Furthermore, the use of 6.9 kv obviated introducing a new voltage level in the plant.

Existing 6.9-kv and 575-v distribution facilities were principally open-type switchgear, cable feeders in conduit, a little underground duct line, and a few long runs of direct buried cable on incoming services and ties. Satisfactory for the old mill, this system could not meet expansion demands and integrating it with the higher-capacity equipment would have been tantamount to a major alteration. Consequently the old and new layouts have been separated, and power is now distributed from the two new 12,500-kw generating units and the transmission system.

Grinders Big Users of Power

It was first proposed that all 6.9-kv switchgear and 34.5/6.9-kv transformers be placed in the power plant for direct supervision by station operators. But the largest concentrated power use in the mill is the new grinder room, some 600 ft from the power plant. There each of six 6,000-hp motors drives a bank of two Great Northern waterous pulp grinders. Loads nearer the power house absorb much of the steam unit output, and incoming 34.5-kv power is used largely in the grinder room and adjacent areas.

Accordingly, main transformers and some 6.9-kv switchgear are in the grinder room. Such installation avoids unduly long leads for large motors and saves on the length of 34.5-kv connections between transformers and the high-voltage substation.

The two main transformers are each 18,000/24,000 kva, 3 phase, 40-cps, 34.5-kv delta to 6.9-kv wye, oil immersed with nitrogen gas protection above the oil. Segregated-phase bus duct joins low-tension terminals and indoor 6.9-kv switchgear. Low-voltage neutrals are brought out through the transformer tank bushings. Each transformer has automatic water-fog fire protection and alarms for high and low nitrogen pressure.

The first 12,500-kw steam generator's neutral is grounded through a 2-ohm resistor. The large grinder motors, although wye connected, have ungrounded neutrals. Were the generator out of service, the 6.9-kv system might conceivably operate ungrounded, under certain conditions delivering destructive voltage to the motors.

Ground Networks Tied

Investigation showed that when the transformer's neutrals are grounded through 2-ohm resistors, currents circulating through the neutral and windings of the grounded generator would not be excessive. Hence this double grounding was adopted. Transformer

UNIT SUBSTATION TRANSFORMERS SERVE THE PLANT THROUGH SWITCHGEAR ON OTHER SIDE OF BUILDING WALL

neutral resistors are mounted on wall brackets next to each transformer, safely above deep snows. Short straight connectors can be used between resistors and neutral bushings. As ground electrode resistances are relatively high, ground networks at the power plant and grinder room are tied together by cable in the concrete envelope of the duct lines to assure proper relay operation.

Ducts Are 5-in. Fiber

Low-pressure, gas-filled cables connect main transformers with the 34.5-kv' substation. Conductors are 350 MCM, compact sector stranded, with 410-mil paper insulation, shielding tape, and 145-mil Neoprene jacket over the lead. Outside diameter is about 4.14 in. Ducts are 5-in. fiber. Its self-monitoring feature for detecting breaks in sheath, splices, and terminations recommended gas-filled cable over solid insulated cable.

Transformer differential relays are at the 6.9-kv switchgear, the differential zone extending to the 34.5-kv substation, transformer, cable, and high and low side breakers. These circuits have over-current back-up relays. Alarms for nitrogen-pressure loss in cables and transformers are adjacent to the grinder room 6.9-kv switchgear. Main 6.9-kv switchgear is of indoor metal-clad construction and has draw-out air type circuit breakers rated to interrupt 500,000 kva at 7.2 kv. Reactors rated at 5% are at the power plant end of two 1,000-amp grinder room tie circuits where they limit the interrupting duty of the breakers.

Switchgear in Two Sections

In an electrical bay open on one side to the grinder motor room is the second group of 6.9-kv switchgear. This group is in two sections without ties between them. It includes transformer and power station tie circuits, leads from motor breakers to the six grinder motors, and feeders to unit substations in nearby mill buildings.

Immediate overloading of the generators would follow a 34.5-kv system outage when the mill is operating and the tie circuits to the grinder room are closed. Although grinders may be stopped briefly without serious consequences, generator bus voltage failure would interrupt paper machine auxiliary supply, halting production.

Relays Trip Motors

Hence underfrequency relays at the power plant bus trip the six grinder motors and the main transformers on falling frequency. These relays simultaneously transfer the No. 1 steam unit from back pressure to speed governor control. The latter operation leaves the power plant free to carry essential machine room, screen room, and filter plant loads while the grinders await restoration of power.

A partition wall through which the motor drive shafts pass divides the grinder building longitudinally and is carried part way to the roof. Fresh air is drawn in by fans between groups of switchgear. Air is filtered, heated when necessary, and channeled into tunnels under the floor to the motor foundation pits. After cooling the motors, the clean, dry air flows over the wall to the humid grinder area.

Motor losses contribute to grinder area heating. Each motor, rated at 6.9-kv, unity power factor, 3-phase, 367 rpm, and 40 cps, has two bearings, 14-in. shaft diameter at the drive end, overall stator diameter of 11 ft, 8 in., and 110,000 lb total weight. These motors are wye connected with current transformers on the neutral leads in the motor pits, and have differential and overcurrent ground protection.

Drainage Provided

Grinder governors of wattmeter type hold motor load constant by varying hydraulic pressure on the rams. These rams force logs against the stones in response to impulses from a contact-making wattmeter. Grinders start unloaded. To eliminate starting equipment, motors were selected for across-the-line starting at a maximum of two starts in any half-hour.

The underground system is mostly 4-in. fiber duct in concrete envelopes. Spare capacity is provided in manholes and duct lines. The system follows the land slope toward the river. Drains are provided at the lowest manhole, the 34.5-kv substation, and one manhole near the chemi-groundwood plant. A gravel backfill drain to the river prevents seepage of water containing sulphur and soda ash into duct lines.

Paper-insulated, lead-covered cable

Paper Company Revamps Power System; Triples Output

composes the 6.9-kv underground distribution circuits. It was preferred to oil base cable which would have required oversized ducts and would have been more expensive even considering the cost of load-cable potheads and splices. Potheads for 34.5-kv cables and for most of the 6.9-kv lead-cable terminations are the metal-to-porcelain soldered type.

Some Oil Cable Used

For generator and grinder motor leads, other 6.9-kv indoor circuits in the power plant, and 2.4-kv circuits in the mill, however, oil base insulated cable was adopted. Cable for 600-v service is oil base, single conductor in the power plant, and multi-conductor with Neoprene jacket for underground control circuits.

Originally all utilization equipment, except large grinder motors, was conceived as rated at 575 v. When a considerable number of 250-1,000-hp motors were found to be necessary, the designers considered it economical to add a 2.4-kv level for larger drives.

Transformers Outdoors

Metal-clad unit substations with draw-out air circuit breakers are in mill buildings near load centers. Transformers are generally outdoors with bus leads to switchgear. Each substation is equipped with an inclosed primary isolating switch capable of breaking magnetizing current. Switch compartments contain 6.9-kv cable potheads. Substation transformers are wye-connected on the low side, the neutrals being brought out through a bushing. These transformers are self-cooled and provision has been made for future fans. Askarel-filled units were preferred to oil-filled units, the cost of fire protection for the latter exceeding the price differential between the two types.

Stub Bus Used

The four 2.4-kv unit substation transformers are each rated at 5,000 kva, 6.9/2.3 kv. The secondary is connected directly to a short stub bus in the switchgear. To this stub bus, draw-out air circuit breakers, rated 150,000 kva interrupting capacity at 2.4 kv, are connected to feed 800 and 1,000-hp motors and motor bus sections having motor starters of the high-capacity fuse and magnetic contactor type. They serve also as tie circuits. Control power for breakers and magnetic contractors is supplied by rectifiers in the switchgear. Tripping devices protect against undervoltage.

Systems Are Underground

Nine 575-v unit substations have 2,000 or 1,000-kva transformers and standard 600-v metal-clad switchgear. Some large motors have electrically operated air circuit breakers for particular services and manually operated breakers for group feeders to motor control centers. Rectifiers and undervoltage trips supply control for switchgear.

Except in the wood room, 2.4-kv and 575-v systems are operated ungrounded. Uninterrupted production is so essential that there is a definite premium on avoiding shutdown with a ground on one phase. Detectors at all substations promptly trace grounds. As transformer neutrals are accessible, grounding can be resorted to whenever unusual resonance result in "arcing grounds."

575-V System Grounded

As the wood room was needed before completion of the power plant and distribution system, its 2,000-kva substation was connected to an existing 6.9-kv line. This isolated unit can be shut down briefly without serious interference with paper or pulp production. This 575-v system is operated grounded because its equipment is subject to unfavorable operating conditions. Squirrel-cage induction motors drive most utilization equipment. Paper machines are steam turbine driven, with certain parts electrically run from generators powered from the line shafts.

In general contractors for 575-v motors are concentrated in motor control centers housing auxiliary control equipment. Some local push buttons with an ammeter on one phase give operators rough indications of machine loadings. Terminal blocks and wiring gutters are used at control centers, and unit wiring is standardized somewhat to allow ready interchange or replacement of contactors and other devices. Fused switches act as disconnects.

Two small-capacity, 60-cps systems are carried throughout the plant. One is fed by a frequency-converting synchronous motor-generator set in the power plant and supplies standard commercial equipment, such as, water coolers and office machines. The other, taken from the regulated public utility system, is used for clocks and recording instrument chart drives.

When the regulated supply is interrupted, its load is automatically transferred to the mg set. Besides power cables the underground system carries control and auxiliary service circuits. Special provision has been made for regular and emergency supply and control of power for fire pumps and related equipment.

Paper Industry Expanding to Meet Demand

Modernization of Great Northern Paper Co's East Millinocket, Me., plant, described in the accompanying article, is in keeping with the progress being made by the paper industry. Practically all manufacturers are modernizing their old plants, building others, or both. Latest survey by the McGraw-Hill Department of Economics shows that the paper industry expects to spend $640 million for new plants and modernization programs in 1956, 30% more than in 1955.

The paper industry, centered in Canada and a few northern border states having extensive stands of timber, has been expanding its operations in the southeastern states. Indications are that a new process using Southern pine pulp is proving successful. Some of the new mills are being erected in this area.

For electric companies serving paper mills the boom in the industry is good news. The paper industry is one of the biggest users of electric power. In 1953 (latest figures available) the industry used 21,578,000,000 kwhr of energy.—The Editors

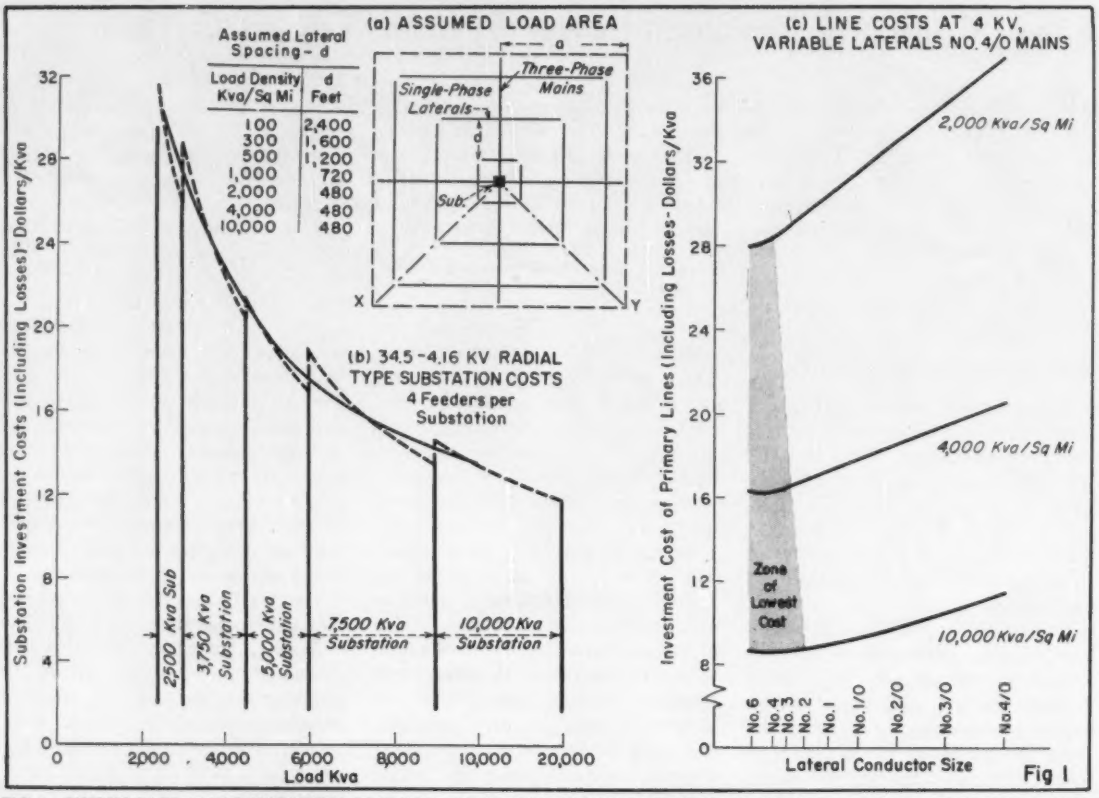


FIG 1—CURVES PLOT 4-KV SUBSTATION COST WITH LOAD KVA, PRIMARY COST WITH VARIOUS LATERAL CONDUCTOR SIZES

Coordinating Substation Size with . . .

Right Conductor Saves Money

DISTRIBUTION
Design

Balancing components of primary distribution system provides greatest economy. Proper choice will be adequate for load growth

H. M. RANKUS, General Electric Co, Schenectady, N. Y.

The selection of primary conductor sizes for a new load area to afford lowest combined cost of substations and lines, rather than minimum line cost alone, can cut the total cost of the substation and primary-line portions of a distribution system 10 to 20%.

Although cost of primary lines tends to increase with conductor size, larger conductor sizes on the other hand permit larger feeder loads and consequently larger substations. Accordingly, greater line cost is offset by the larger substation's lower cost per kva. Thus the most economical distribution system is obtained when both components balance to give a minimum overall cost of primary lines and distribution substations.

At both 4 and 12 kv, 3-phase primary mains should be 4/0 or larger to achieve this balance. Economical lateral conductor size depends on the distribution voltage. Primary conductors of about No. 1 or 1/0 size cost least at 4 kv. But at 12 kv, the economical size is from No. 4 to No. 2.

Despite the fact that economical conductor size tends to increase with load density, exact size is not critical. A size selected when loads are light continues to be adequate at very heavy densities. The optimum conductor size, therefore, must be selected initially as savings from use of large conductors are not comparable with reconductoring costs.

Choice of most economical conductor size for 3-phase mains and single-phase laterals is practically independent of such variables as the evaluation of losses, design voltage drop between first and last transformers, and the comparative costs of primaries and substations. Thus it appears that standardization of conductor sizes on a particular system is consistent with maximum system economy. Optimum

The author acknowledges assistance of the digital computer staff of Systems Analyzers of the General Electric Co in calculating data for Figs 2 through 4.

conductor size is not much influenced by the substation type. Yet savings obtainable from the optimum conductor size are correspondingly greater for the more expensive substation arrangements.

Furthermore, larger substations mean fewer substations and location farther apart. As it is becoming increasingly difficult for some utilities to obtain enough suitable substation sites, larger substations without a corresponding increase in the number of feeders and addition of long express feeders have distinct advantages.

Lateral Needs Increase

Customarily, 3-phase primary mains radiate in several directions from the distribution substation and single-phase laterals from the mains to each utility customer in the load area. A generalized load area of this type, illustrated in Fig 1 (a), is assumed with the substation at the center. Load is uniformly distributed throughout the area. Load in the square area is fed by four feeders, each supplying a triangular area, such as is enclosed by points S, X, and Y. As primary laterals must reach each customer, the number of laterals increases as the area becomes more densely populated and load density increases. Assumed lateral spacing is shown as a function of load density in the table in Fig 1.

Load area dimensions are determined either by voltage drop limitations or by conductor thermal limits. Assumed thermal limits for various conductor sizes are given in the table which also shows the assumed line costs in dollars per mile of line.

Cost Spread Over Kva

Voltage drop in primary lines between the substation and the end of the last lateral is assumed to equal 3.5%. Part of this drop occurs in the 3-phase main and part in the lateral. By increasing conductor size of mains or laterals, the voltage drop per unit length is reduced, and the line can extend a greater distance before the 3.5% limit is reached. Thus, in a uniformly distributed area the area served by one feeder increases, and the load per feeder increases accordingly. In calculating voltage drop, power factor is assumed to equal 95%.

Considering line costs alone, the most economical conductor size combines the lowest installed line cost and the lowest cost of capitalized losses. As distributed load is picked up on distribution feeders and total feeder loading is often held down by voltage drop considerations, distribution system losses are generally not great enough to justify larger conductor sizes on a loss-reduction basis. This is particularly true of lateral conductor size, as shown in Fig 1 (c).

Increasing conductor size does not change the miles of laterals required, as laterals must cover the entire areas to reach every customer. On the other hand, the cost of larger conductor sizes for mains is partially offset by spreading that cost over a greater kva because the cost of mains per kva decreases as area spreads.

Maximum Overload 20%

Cost per kva of substations diminishes rapidly as substation kva go up, especially when the number of feeders does not increase with kva. Savings possible through use of larger substation sizes are charted in Fig 1 (b). The solid curve giving average costs was obtained by drawing a smooth curve through the costs at rated kva for a number of standard substation sizes. The dotted curve shows how the cost per kva of each size varies with kva within the kva range used.

In this study, a maximum substation overload of 20% is permitted. Subtransmission voltage is 34.5 kv when primary voltage is 4.16 kv, and 69 kv when primary voltage is 12.47. Losses are evaluated at $200 per kw for load losses and $350 per kw for transformer core losses. These values approximate a loss valuation of $20 per kw demand charge and 4 mills per kwhr energy charge, when these are capitalized at 15%.

Substations Radial Type

Total substations and primary lines cost is shown in Fig 2 as functions of conductor size for 4.16-kv distribution. The substation portion of total cost is based on radial-type substations arranged as in the diagram, Fig 2 (c). Costs are based on two-feeder substations through 1,000 kva per sq mile. The feeder is bifurcated on the secondary side of the breaker so that each feeder breaker serves two triangular load areas. At load densities of 2,000 kva per sq mile and greater costs are based on four-feeder substations.

Fig. 2 (a) shows total costs as functions of 3-phase main conductor size.

Assumed Conductor Thermal Limits and Line Construction Costs

Conductor Size	Thermal Limit, Amps*	Installed Conductor Cost/Mi 3-Phase Mains	Single-Phase Laterals
No. 6	112	.....	$530
No. 4	154	.....	725
No. 3	180	.....	850
No. 2	209	$2,000	1,000
No. 1	244	2,350	1,175
1/0	283	2,800	1,400
2/0	335	3,350	1,675
3/0	389	4,000	2,000
4/0	446	4,800	2,400
250 MCM	502	5,400	2,700
300 MCM	564	6,200	3,100
350 MCM	622	7,000	3,500
400 MCM	679	7,750	.....

Installed Cost of Pole Line and Hardware for 4/0 and smaller is assumed to be:
4.16 Kv=$3,000/mile 12.47 Kv=$3,200/mile
(For 250 MCM and larger add 10%.)
Total line cost equals installed conductor cost per mile plus installed cost of pole lines and hardware per mile.

*Based on 40C rise over ambient for bare overhead conductor. 1.36 miles/hr. (2 ft/sec) wind. Conductors 97.3% conductivity, hard drawn, stranded copper.
Substation costs based upon manufacturers handbook prices for unit substation equipment including high voltage switchgear, as of final half of 1955, plus an estimated 30% added to cover cost of foundation, installation, and landscaping.
Radial substation Kva range of operation based upon using each standard substation size up to 20% above rating. Double duplex range of operation based upon maximum 33⅓% overload of one transformer with the second transformer out of service.

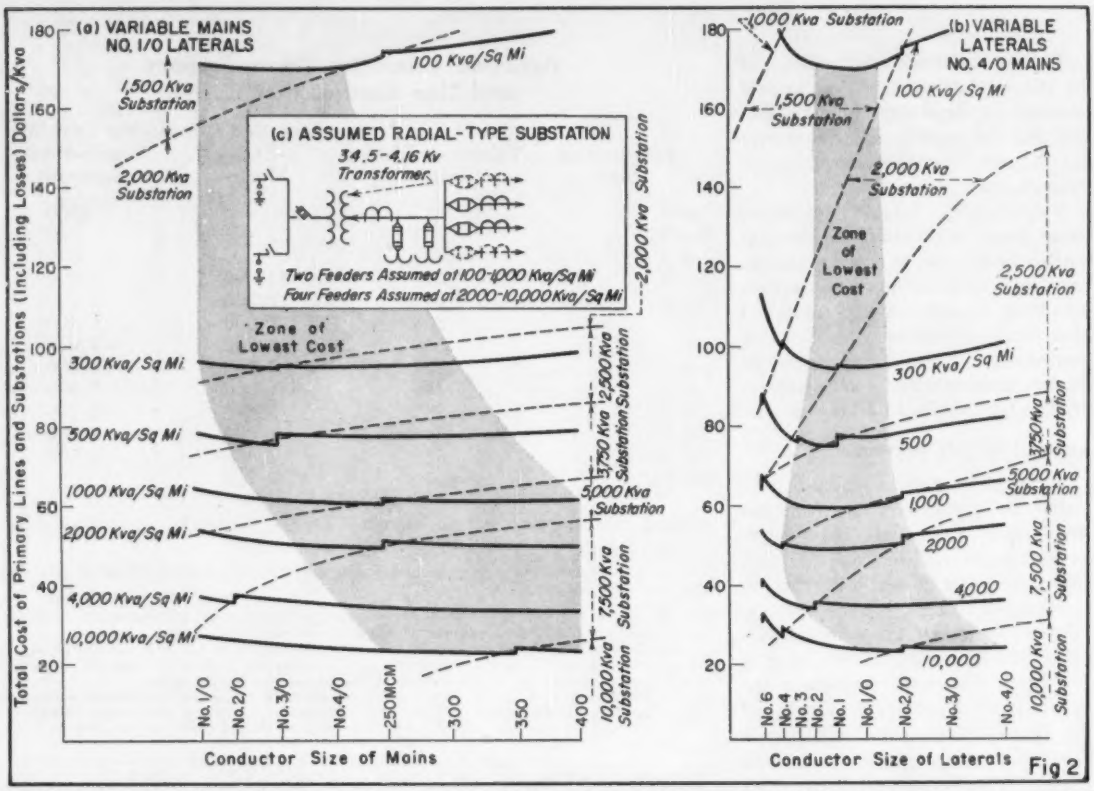


FIG 2—COMBINED EVALUATION OF 4-KV SUB AND PRIMARY CONDUCTORS BOOST ECONOMICAL LATERAL SIZES, FEEDERS

Lateral conductor size is constant at 1/0. Fig 2 (b) shows total costs as a function of lateral size with 4/0 mains. The dash lines indicate the approximate boundaries within which each standard substation rating would be used.

For an example, refer to the 2,000-kva-per-sq-mile cost curve of Fig 2 (a). The curves indicate that when 3-phase mains are smaller than 1/0, a 3,750-kva substation adequately serves the area load. By increasing conductor size, the area served from one substation without exceeding voltage drop limitations is increased sufficiently to use a 5,000-kva substation. When 250-MCM and larger mains are used, the area is great enough to require a 7,500-kva substation, load density remaining constant. Where substation size is changed, there is a break in the curve.

Vary Little Within Band

A comparison of Fig 2(b) with Fig 1(b) and Fig 1(c) shows that the lower cost per kva of larger substations offsets substantial rises in conductor cost to such an extent that the most economical lateral size is raised from No. 6 or No. 4 to No. 1 or larger. Sharp reductions in system costs are achieved by selecting conductors giving lowest total cost, rather than merely lowest line cost.

Consider a 10-sq-mile area with an initial density of 100 kva per sq mile. With regard to line costs alone, Fig 1(c) indicates that No. 6 would be an adequate lateral size through 4,000 kva per sq mile. If No. 6 laterals were installed initially, along with 4/0 mains, line and substation costs would total $197.50 per kva at 100 kva per sq mile. Substitution of 1/0 laterals reduces total costs to $170.80 per kva, a 13.5% reduction. By the time the area has grown to a density of 4,000 kva per sq mile, savings through use of 1/0 laterals are $210,000 for the 10-sq-mile area.

Fig 2 shows a broad band of economical conductor sizes with very little variation within the band. Over a wide range of conductor sizes, savings through use of larger substations approximately equal the increased cost of larger conductors. This is fortunate. Even through the most economical conductor size tends to increase slightly with increasing load density, the band of economical sizes is flat enough so that each size can be selected as standard regardless of density. The error is never very great.

Line Changes Costly

In general, it is not economical to change conductor sizes on an existing line. Once a particular size is installed, it probably remains throughout the life of the line. Therefore, correct size for the load conditions anticipated should be selected at the start.

Dollar savings gained by selection of the optimum conductor size are potentially much greater for laterals than for primary mains. This is evident from the fact that the curves of Fig 2(b) dip more sharply within the range of conductor sizes which might be considered than do the curves for the mains, Fig 2(a). Economical size of mains is not nearly so critical as that of laterals.

Economical sizes of mains and laterals are not interrelated to any great extent. Changing the size of

one does not materially affect the size of the other which proves most economical.

Although economical size for mains tends to increase with load density, an average value, such as 4/0, approximates the most economical value for a wide range of densities. In the absence of more compelling economic advantages for large conductor size, even at very heavy densities, the choice between primary mains of 4/0 or a larger size rests on other factors. Conductors of 250 MCM and larger are more difficult to install than smaller sizes. However, such large conductor sizes have greater reserve capacity and can be used as tie circuits between load areas in the event of a substation outage.

Higher Voltages Popular

Another factor in selecting conductor sizes for both mains and laterals is the range of substation sizes that fit various combinations of conductor sizes. The larger the conductor, the larger the substation can be and still use the full substation capacity. This means that substations can be situated farther apart, thus relieving the problem of finding a sufficient number of adequate substation sites.

Furthermore, by proper choice of conductor size, the number of different substation sizes for covering all possible load conditions is minimized. This reduction promotes system standardization.

Higher distribution voltages, especially 12 and 13 kv, are becoming more popular, and new construction in many areas today is exclusively at these voltages. Hence investigation of substation-conductor economics at 12 kv is pertinent. Figs 3(a) and (b) gives economical conductor sizes at 12.47 kv for mains and laterals, respectively. Fig 3(c) shows the 4-feeder substation arrangement assumed for these curves.

As at lower voltages, economical conductor size tends to increase slightly with increasing load density. But the change is not great. Sizes selected for light densities continue to be adequate as load grows.

Economical lateral sizes range from No. 4 to No. 2 at 12.47 kv. Thus they tend to be smaller at the higher distribution voltages. This is because substation costs are a smaller part of total line and substation cost at 12 than at 4 kv. Substation size is already large for the higher feeder loadings at 12 kv. Further increase in substation size affords less reduction in substation costs than a corresponding kva increase when the initial kva is smaller. As a result, there are less potential savings in the substation to balance higher line costs. Savings are obtainable, however, and economical lateral size at 12 kv is larger than the size indicated by conductor economics alone.

Greater Loading Feasible

Unlike laterals, economical size of 3-phase mains is just as high in a 12 as in a 4-kv system when they are loaded to their voltage or thermal limits. Comparison of Fig 2(a) and Fig 4(a) shows that at some loads in a 12-kv system mains even larger than those applicable at 4 kv may be considered. This is primarily because small conductors at 12 kv are limited thermally to a smaller load than voltage drop limits would permit.

In the study thermal limits of laterals were not reached at either voltage. They were reached in the mains at 12 kv only. In general, if it is assumed that conductors are loaded

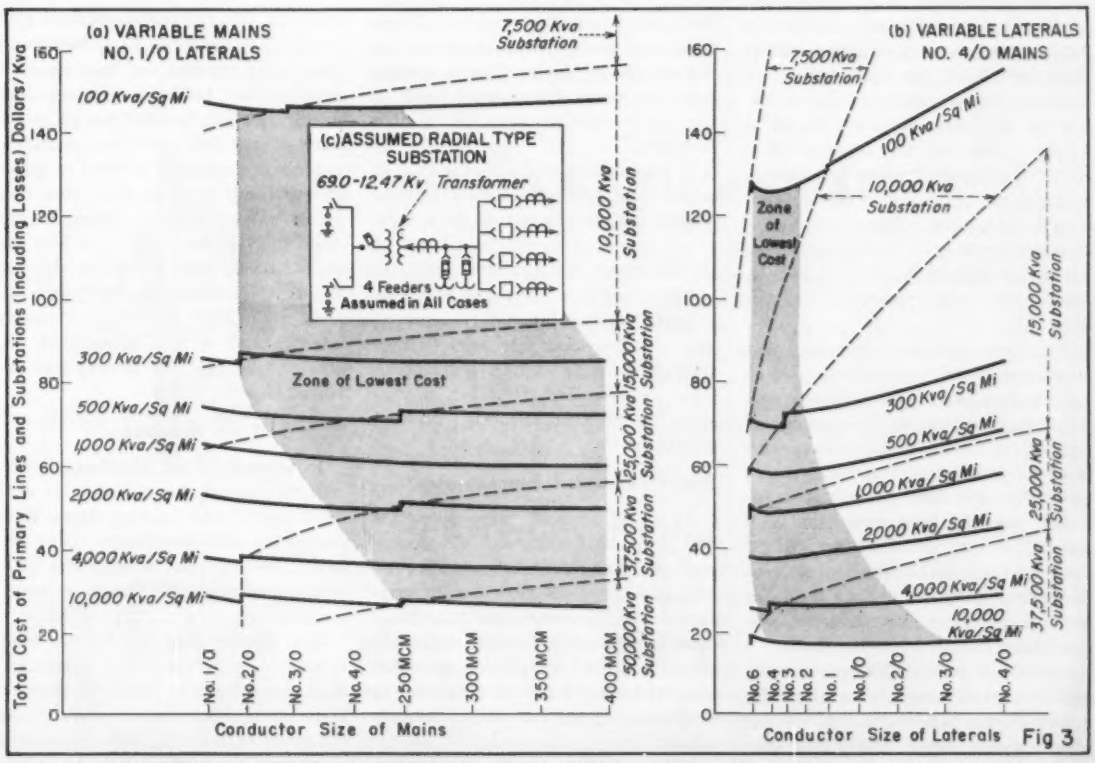


FIG 3—12-KV DISTRIBUTION JUSTIFIES BIG SUBSTATION; GIVES OVERALL SAVING WITH RELATIVELY SMALL LATERALS

to either their voltage or thermal limits at 4 kv and 12 kv, the lower the voltage the higher must be the load density before conductors are thermally rather than voltage limited.

Fig 3(a) shows which conductor sizes up to 400 MCM are economical in particular instances. Such sizes are economical only when conductors are loaded to the voltage or thermal limits. Feeder loading can be much greater than many utilities place on a 12-kv feeder. Loads up to 13,000 kva per feeder were reached in this study. Unless feeders are fully loaded, there is little reason to use the large conductor sizes except as emergency tie circuits.

A 1/0, 3-phase feeder becomes thermally limited at approximately 6,100 kva. This size is adequate when 6,000 kva per feeder is the maximum allowed. When there is duplication of service within the substation and adequate sectionalizing out on the feeder, there seems to be little reason for not loading feeders to the maximum permissible by the large conductor sizes.

Some Costs Excluded

The curves of total line and substation cost, Figs 2 and 3, should not be understood as a comparison of 12 and 4-kv distribution. Although the curves show a strikingly lower total for 12 kv, the cost of distribution transformers and subtransmission are not included. Both are higher at 12 kv. Nor has any attempt been made to compare the two distribution voltages on the basis of service continuity. At each voltage radial substations were considered. A radial substation outage at 12 kv, however, affects far more customers than at 4 kv.

The curves are based on radial-type, single-transformer substations. Often service continuity and voltage regulation requirements of the area served necessitate installing substations with reserve transformer capacity and more than one level of voltage regulation. As the investment for such substations is substantially greater than for the radial substation, a question arises as to what effect their use has on the primary conductor size economics developed in this study.

In Fig 4 higher density variable lateral curves are shown for the double-duplex type substation instead of the radial type. The higher-cost substation not only increases the total line and substation cost but causes substation costs to have a greater influence on the total. This is evident from the more pronounced break in the curve when substation size is changed.

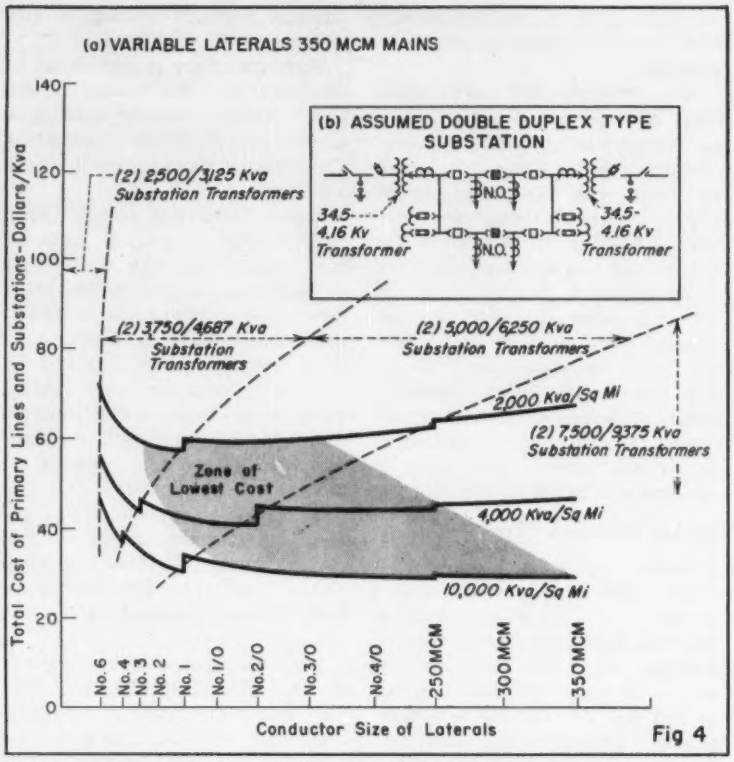


FIG 4—DOUBLE DUPLEX 4-KV SUBSTATIONS INCREASE THE OVERALL COSTS

Economical lateral size at 4 kv continues to be in the No. 1 to 1/0 range despite the change in substation type. Later use of 1/0 instead of No. 6 laterals means that $353,000, or 17%, can be saved in a 10-sq-mile area with a load density of 4,000 kva per sq mile. Thus a more expensive type of substation yields savings correspondingly greater. This equation emphasizes the need of selecting optimum conductor size.

Standardization Practicable

That economical size does not change has this advantage: Conductor size can be standardized regardless of substation type. It may also be concluded that line costs other than those used in the study do not materially affect the overall comparison, provided that the installed cost of conductor is roughly proportional to conductor weight.

This study has not attempted to include the effect of subtransmission system costs in the economic comparison. They were omitted not because such costs do not influence primary conductor size but because the great variety of possible subtransmission arrangements makes it difficult to select one that will apply to more than one actual power system. Geographical disposition of the load areas and extent to which load is concentrated influence the subtransmission system far more than they do the distribution system. This is true because of the greater total load and greater area involved.

Reduce Line Mileage

In general, larger distribution substations reduce the mileage of subtransmission lines serving them, thus decreasing subtransmission costs per kva. This, in turn, stresses the economic desirability of larger primary conductors.

But the fact that when more load is carried, subtransmission conductor sizes may have to be increased or more lines added counteracts to some extent the effect of reducing subtransmission mileage.

Triple Drive Aims at Community, Slum Rehabilitation

Americans have decided they no longer can afford the expense of slums, of substandard housing, of depressed neighborhoods. On several fronts movements have been started to work toward the removal of these blights from cities and communities. Individuals, groups, and organizations are joining efforts and resources in positive campaigns to overcome public and municipal apathy and to stimulate neighborhood rehabilitation programs.

Rewards are inherent for all participants in these programs: Increased home valuation for the home owner; increased sales of materials and services for builders, manufacturers, and contractors; increased electrical loads to utilities through improved wiring and more appliances; and, of course, increased sales of appliances by manufacturers and dealers. It doesn't seem that anybody can lose in these worthwhile efforts. And the benefits can extend into such immeasurable aspects as reduced juvenile delinquency and reduced crime rates (by removing the blighted areas where these things thrive).

Today two national organizations exist to stimulate communities to set up programs of rehabilitation. And one local group has set out to show how to rehabilitate old homes.

The Three Weapons:

ACTION

American Council To Improve Our Neighborhoods

The name is made up of the initials of American Council To Improve Our Neighborhoods. It is a non-profit, non-commercial, non-political national organization to help Americans help themselves to better living and to stop the spread of housing decay. ACTION is governed by a board of directors representing industry, utilities, government, education, finance, civic and trade organizations, labor and political service associations. An executive committee, elected by the board, serves as a working group to implement its decisions and supervises its staff. The staff is directed by a paid president, Maj Gen Frederick A. Irving (ret. USA). ACTION is located at 2 West 46th St, New York, N. Y.

OPERATION DEMONSTRATE

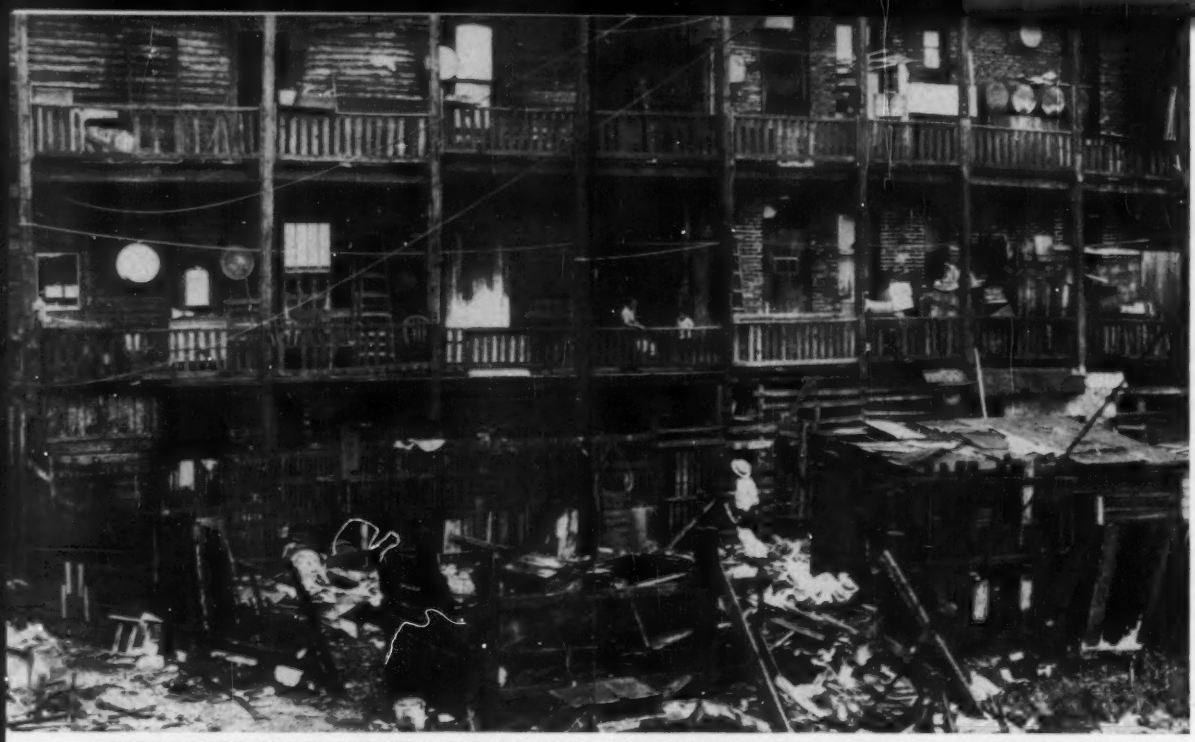
LIVE BETTER... OPERATION DEMONSTRATE ...WHERE YOU ARE

This is a joint effort by various Cleveland groups to show precisely what can be done in housing rehabilitation. Although independent of ACTION and Operation Home Improvement, it is a practical demonstration of steps suggested by both. A number of demonstration houses—in various stages of decay—have been bought up by the sponsoring groups and are being remodeled or rehabilitated with the objective of inspiring Clevelanders to do the same thing to their own homes. Two of the houses have been relocated in the center of Cleveland to attract attention, the others are being remodeled where they are. Requests for information can be directed to: Joseph Guilozet, 1740 East 12th Street, Cleveland, Ohio.

OPERATION HOME IMPROVEMENT

OPERATION '56 ...the year to FIX HOME IMPROVEMENT

This is a commercial organization not associated with ACTION. Its objective is to conduct a year-long campaign designed to coordinate the sales promotion efforts of all the factors in the home improvement business. It operates at the national and local levels and is aimed at encouraging more people to improve their homes and to make it easier for them to buy materials and services. OHI is sponsored by the U. S. Chamber of Commerce and is represented by a small task force set up by the building industry in cooperation with its trade associations. Executive director is John R. Doscher, and the group is located at 10 Rockefeller Plaza, New York 20, N. Y.



MORE THAN FIVE MILLION FAMILIES IN THE U. S. LIVE IN SURROUNDINGS SUCH AS THESE WHICH PROVIDE ANSWER TO:

Why ACTION?

ACTION
American Council To Improve Our Neighborhoods

One of the country's main assets is its housing inventory valued at $250 billion. This is 2½ times the total assets of America's 500 largest corporations. The equity the owners have in the 45 million nonfarm homes alone is approximately $170 billion. Furthermore, ever since the war, this country has built the astonishing total of a million new homes a year.

But this entire investment is menaced, according to ACTION. Nearly half of the 45 million dwellings need routine annual maintenance to remain in acceptable physical condition. Another 20 million urgently require repairs and improvements, many complete rehabilitation. As many as 5 million slum dwellings must be demolished and replaced by new homes.

And the reason behind this critical situation, says ACTION, is public apathy. Public apathy, inadequate information, and individual loss of pride in homes are threatening a primary national asset. It is to remove this apathy and to stimulate an increasing pride in the home that ACTION was organized.

An investment of $100 billion by the American public can eliminate slums and housing blight in ten years, says ACTION.

Estimates prepared by public and private economists show that for a great part, landlords and tenants are not maintaining or improving their properties adequately. In 1953, according to the Federal Reserve Board, 42% of the home-owning, nonfarm families made no expenditures on their homes—not even for a coat of paint. In early 1955, the Board reported that less than a quarter of all non-farm families planned to spend over $50 on their homes during the year.

Despite the neglect of these property owners, the present total expenditure for the maintenance and improvement of existing homes, according to the U. S. Chamber of Commerce, is about $12 billion a year. This is almost the amount spent on new residential construction.

ACTION hopes to help bring housing improvement expenditures up to the needed level by awakening the American people from the apathy that has caused them to neglect the condition of their homes. Implementation of the ACTION program could easily double the present rate of expenditure for housing maintenance and improvement.

It has been proved repeatedly that one of the major sources of crime, delinquency, disease, and social unrest is the blighted, decaying slum areas across the nation, ACTION points out.

The ultimate goal, says ACTION, must be to tear down and replace all existing unlivable units. This is a long-range objective and not immediately attainable. Also, if all emphasis were laid on slum clearance only, new slums would develop. Therefore, it is necessary to protect and repair salvageable homes before these useful units fall into the slum category.

Campaigns directed toward replacing slums where possible, building only well-constructed new housing, rehabilitating poor dwellings, and maintaining good ones will eliminate a significant contributing factor to the nation's over-all slum problem, ACTION points out.

How ACTION Operates

ACTION does not replace or displace any existing private or public service organizations. Instead it cooperates with both national and local groups at the community level. ACTION reaches each community through one or a combination of the following: public interest groups, professional associations, women's federations, trade, union and industry organizations. It might also work with unaffiliated local citizen groups or directly through your municipal government.

Three divisions carry out the ACTION program:

1. The Research Division serves as a continuous stockpiler of facts and a central source for information on housing and related technical, economic, sociological, legal, and financial findings so that industry, government, associations, and homeowners can tackle housing objectively.

This is a new kind of source to which citizens, builders, municipal officials, or any other interested group can turn for the collected record of information, experience, performance, and result regarding various aspects of community development problems. Published "Reports from ACTION" provide information to people throughout the country. Forty titles are included in the first series of these memoranda (see box, right, for partial listing).

2. The Information Division maintains a broad and continuous informational program to supply the facts of experience to all Americans to show what has and can be done by individuals and groups of citizens to improve homes and communities. Its initial task has been the preparation of a national education program designed to alert Americans to housing opportunities and problems.

In addition to arousing people to the need, emphasis is being laid on the nature of the problem and the "how" of organizing one's neighborhood and community in order to improve the local housing situation.

3. The Field Service Division, on request, provides special advice and guidance on community problems.

Although every city has different problems and varying degrees of civic support, this staff can provide a general knowledge on housing research techniques, code enforcement, legislation, community organization, and planning. Often it serves as a catalyst to bring local forces together behind the common objective of slum prevention and clearance where necessary.

ACTION is multiplying its effectiveness by establishing close working relationships with national public interest groups, service and trade associations, labor organizations, and producers as well as with private and public groups concerned with housing and urban renewal problems.

The Advertising Council, Inc, a non-profit organization, is handling the advertising for ACTION. The council was founded and is supported by American business to conduct national advertising campaigns.

ACTION Literature

Among titles of research memoranda and booklets available from ACTION are the following:

- **American Housing Statistics: Condition, Supply, Demand.**
- **100 Selected References: Problems of Community Development.**
- **Volunteer Property Inspection: Norristown, Pennsylvania.**
- **Sources of Aid to Community Development and Improvement Programs.**
- **Citizen Organization for Community Development.**
- **Selected Queries to ACTION.**
- **Case Study: Quaker 'Self-Help' Rehabilitation Program in Philadelphia.**
- **Case Study: Baltimore Housing Court.**
- **Case Study: Baltimore Fight Blight Fund.**

ACTION PRES Maj Gen Frederick A. Irving examines a slum clearance project undertaken by private capital in Baltimore

Cost of ACTION Comes High –

ACTION estimates that an investment of $100 billion in the upgrading of the nation's nonfarm housing supply over ten years can stop the process of urban deterioration and needless obsolescence of structures.

"The Urban Renewal problem is a problem of growth," said the consultants who prepared ACTION's 1954 Urban Renewal Research Program. "Although American cities are 'new' by world standards, the very pace of industrialization, urbanization, population increase, and rising standard of living has created problems of obsolescence—social and functional obsolescence as well as physical obsolescence."

Three Problems Seen

The estimated $100-billion investment, which is in addition to current expenditures, would attack three main problems of community blight and accumulated obsolescence:

1. $40 billion for minimum rehabilitation and upgrading of nonfarm nonslum housing which is below standards of safe, sanitary, and convenient family living.

2. $50 billion for clearing and replacing the slums which cannot be salvaged.

3. $10 billion for local neighborhood improvements of recreation, traffic, and other public services in rehabilitation areas.

Cost Estimated at 3% of GNP

An investment of $100 billion, at an annual rate of expenditure of $10 billion, represents less than 3% of our present annual Gross National Product. However, $100 billion represents about 40% of the current value of our nonfarm housing inventory and will therefore not only save but also enhance the investment in this sector of the economy. The impact of this $100-billion expenditure is detailed below:

The $40 billion for rehabilitation would be spent to remove the physical obsolescence from our nonfarm nonslum houses. A minimum of 20 million of these units lack hot running water, private toilets and bathing facilities, modern heating systems, and adequate electrical wiring, or need structural repairs and refinishing of walls, foundations, and roofs.

The $40-billion dollar expenditure would be allocated among mechanical, structural, site, and other property improvements. Recent FHA home improvement loans for single family dwellings average $466 for plumbing, $550 for heating systems, $350 for insulation, $640 for interior finish, $444 for roofing, $729 for exterior finish, and $871 for additions and alterations.

Home Improvement Backlogged

It is estimated that at present fully half of the expenditures on existing dwelling units is spent by only one-tenth of those making expenditures. Furthermore, half of the householders make no expenditures during the year to improve their homes.

Although tenants and property owners (including those who finance improvements through the FHA) spend an estimated $12 billion each year on the existing inventory of housing, there is a backlog of rehabilitation and improvement of at least $40 billion needed to bring all nonfarm nonslum

How Electrical Industry Can Assist ACTION

1. **Make available to local blight-fighting groups the utility's research files relating to the mobility and growth trends of the population, the market potential, and other useful information.**

2. **Enclose ACTION literature as "stuffers" in routine statements to customers.**

3. **Have the company's meter readers secure answers to home improvement questionnaires. The meter readers can be a direct link in communications between company and customers.**

4. **Support the Advertising Council ACTION campaign, material for which has been distributed by PUAA to members.**

5. **Consider possibility of sponsoring an electrical industry check list for safe wiring.**

6. **With aid of national and local organizations establish home renewal information centers.**

7. **Give ACTION whole-hearted financial support.**

8. **Help arrange showings of 13-minute full color animated film—"Man of ACTION". Film is suitable for TV and theater use.**

9. **Mention ACTION on television and radio programs sponsored by your companies, and tie in ACTION with your promotion and advertising programs.**

10. **Sponsor ACTION presentation to large industry gatherings.**

11. **Provide local leadership. Take active part in community efforts to improve local housing conditions.**

But the Rewards Will Be Higher

units up to norms required for sound family life.

Each dwelling, after it has been upgraded, will have an extended economic life during which time systematic expenditures on maintenance and improvement can be supplemented by a program to replace those structures which in the future will have passed their point of economic value.

Slum Picture Analyzed

The $50 billion for clearing slums and replacing them covers an estimated five million slum dwelling units. Slum clearance alone costs about $3,000 per replacement unit for land acquisition and clearance and for necessary public utilities (this is a total of about $15 billion). The approximate cost of new dwelling units runs about $10,000 per unit including minimum site and neighborhood improvements. Satisfactory new housing in the slum areas would require a reduction in density of about a third of the existing number of units. The cost, therefore, of 3.5 million replacement units would be $35 billion.

As the population returning to replacement units will have to be lower than the former slum density, needed additional units outside the redeveloped areas could create a ten-year market demand for at least 1.5 million additional units of new residential construction and thus help keep new homebuilding at the current rate of 1.35 million units a year (a total of 13.5 million for the ten-year period).

The $10 billion for limited public improvements in rehabilitating neighborhoods encompasses a wide range of items such as street closing, the building of tot-lots, the extension of open spaces, and other important public utilities and community facilities. This type of limited improvements, in conjunction with measures to stabilize the neighborhood's environment by strong and enforceable municipal planning and housing ordinances, provides an essential incentive to the individual householder to make the investment necessary to upgrade his own house.

Private Enterprise Role Cited

"Urban Renewal," as defined in ACTION's 1954 Urban Renewal Research Program, "is the total of all the public and private actions which must be taken to provide for the continuous sound maintenance and development of the urban area. . . . Private enterprise will make the major contribution in the building and rebuilding of urban areas. In the rehabilitation of communities, private development can take place with assurance, and private developers are most likely to invest if there is knowledge that the community itself is working toward common goals."

However, in addition to the limited neighborhood public improvements required, large scale city-wide community facilities programs will be needed.

Urban Renewal Costs Detailed

By 1960, according to the Twentieth Century Fund's 1955 survey of America's Needs and Resources, the estimated requirements for governmental and public utility expenditures of the type which contribute to Urban Renewal programs must show significant increases over actual expenditures in 1950. The Fund's estimate of required increases in the annual rate of governmental expenditure by 1960 in 1950 dollars is as follows:

Needed Increase in Expenditures by Function:

Civilian Public Safety (Fire, Police, and Correction)	20%
Education	71%
Health and Community Facilities	54%
Health	89%
Hospitals	74%
Sanitation and Water Supply	35%
Recreation	58%
Local Electric and Gas Utility	12%

How Electrical Industry Can Benefit from ACTION

It has been said that the vast majority of America's homes are, electrically speaking, obsolete. Twenty-two million American homes have inadequate cooking equipment in their kitchens. Forty-five million lack clothes dryers. Twenty-five million do not have automatic water heaters. Forty million are inadequately lighted. Twenty-one million do not have wiring that will permit the use of these improvements if the occupants wanted to buy them.

Only ten years ago 15% of all electric energy sold was for residential customers. In 1954 this percentage had increased to 26%.

If the ACTION objective to raise all American housing to even modest standards is only 10% accomplished this is what it can mean:

Addition of 2 million electric ranges, 4½ million electric clothes dryers, 2½ million electric water heaters, and 4 million relighted homes.

For the appliance industry this adds up to $2 billion in increased potential sales.

For the utility industry, it means $300 million annually in increased residential revenues.

And this is with only 10% of the objective achieved!

And finally, an improved community is more desirable to new industry.

Information Center Is Key to ACTION's Success

One of the key steps in any ACTION program is an information center. The first such center was opened in Cleveland, and it is serving as a test tube for establishment of similar information centers in other cities.

The Cleveland center was set up by ACTION as a prototype for the duration of Operation Demonstrate. It is a place where citizens of Cleveland interested in improving their homes and in general lending support to the campaign for eradicating slums and fighting blight can get authentic information on the subjects involved.

Today's family shopping for a new home is faced with a variety of "merchandise." His problem is only one of selection.

On the other hand, the home or rental property owner considering modernization of his property is faced with a difficult job. First of all he must uncover all the different kinds of information he will need in a modernization job. Then he has the problem of evaluating the information. Finally, he has to determine how to pay for the work. What are the sources of mortgage money, or what are the sources of loans of various kinds, and which is the best to use under the particular situation. Thus the property owner wants to know what to do, how to do it, and how to pay for it.

Because ACTION is a national organization, non-political, non-commercial, it was felt it offered the right kind of sponsorship to try out an information center and develop the formula for making them successful.

The Cleveland Information Center is located in a building on the Mall in conjunction with the two examples of home modernization being shown by Operation Demonstrate.

Professionals Provide Answers

The center is open six days a week from 11 AM to 6 PM and on Sundays from 2 to 6 PM. In addition to the ACTION personnel staffing the center, various professional people also donate their time. Literature of various kinds is available at the center to assist in answering questions. Experts from local lending organizations, the construction business, and in the design and legal fields, as well as from the city departments are on duty from time to time on a scheduled basis to answer questions in specialized problems.

One of the important services that the information center is rendering is in helping people to understand better what they can and should do within their ability to pay. Frequently a property owner will feel that in modernizing his building, it is important to make it look like the current modern style. The information center points out that styles change, running in approximately 20-year cycles in residential architecture. Therefore, it

ACTION Director and Cleveland Electric Illuminating Pres Elmer L. Lindseth says:

"Americans spend billions of dollars a year on such items as automobiles and fur coats; yet more than eight families out of ten live in homes that are substandard and deteriorating.

"ACTION proposes, through a program of home renewal, to bring American living into some semblance of balance by reorienting it toward its rightful pivotal point—the home.

"For example, four homes out of ten have such inadequate interior electric wiring that they utilize no more than 30-amp, 2-wire service. This means that millions of Americans can hardly even begin to enjoy the benefits of modern electrical living.

"The success of ACTION could well change all this. ACTION proposes to work to bring every home up to at least minimum standards, electrically and in every other way. If this program were only 10% successful, it could mean an extra $300 million annually in residential revenues for our industry.

"And the collateral benefits would be tremendous—a higher general level of prosperity, lower taxes, a marked reduction in slum-bred crime and disease.

ACTION adds up to an outstanding opportunity for the electric utility industry, one we cannot afford to pass up. Our own interests, as well as the nation's, demand that we back ACTION to the hilt with aggressive local leadership in our own communities, and with our dollars."

INDOOR PAINTING
MENACE OF MOISTURE
OUTDOOR PAINTING
A Guide to Cleveland's Housing Laws
10 KEY PIECES in Modern Kitchen Planning
the A B C of home wiring

TRADE ASSOCIATIONS AND GOVERNMENT BUREAUS CAN SUPPLY MUCH USEFUL LITERATURE FOR INFORMATION CENTER

is good economic sense to retain the charms of a bygone day because it may become fashionable again.

As older homes usually enclose considerably more space than can be produced today on an equivalent dollar basis, restoration and rehabilitation, together with installation of a modern electrical system, electrical appliances, air conditioning and heating, can produce a property of considerably improved value.

The information center makes no specific arrangements for the purchase of material or the services of contractors or labor. With this in mind, it furnishes lists of remodeling contractors, the handymen, and others in Cleveland who are interested in remodeling.

To date over 20,000 people have visited the information center with a peak day of 1,800 visitors. Many cities are showing great enthusiasm for establishing their own information centers. Detroit, Chicago, Oakland, Knoxville, and Havana, Cuba, have by now, or are planning to establish, such centers.

Cleveland has found that the support of the local press, radio, and television is essential to the success of the information center. The citizens must know that it exists, and they must be reminded continuously of the existence of the center and what services it can offer them.

At present, ACTION is working on a manual which will be made available for the use of other cities as a guide in establishing home renewal information centers.

Because ACTION does not establish information centers, it is ACTION's hope that cities will develop their own centers in keeping with the ACTION objective to help Americans to help themselves to a better living.

Some Comments on ACTION

President Dwight D. Eisenhower—"I am particularly delighted to see this organization meeting and starting to work. It's the kind of thing that appeals to a soldier's heart: Decide what to do and then do it and stop talking about it."

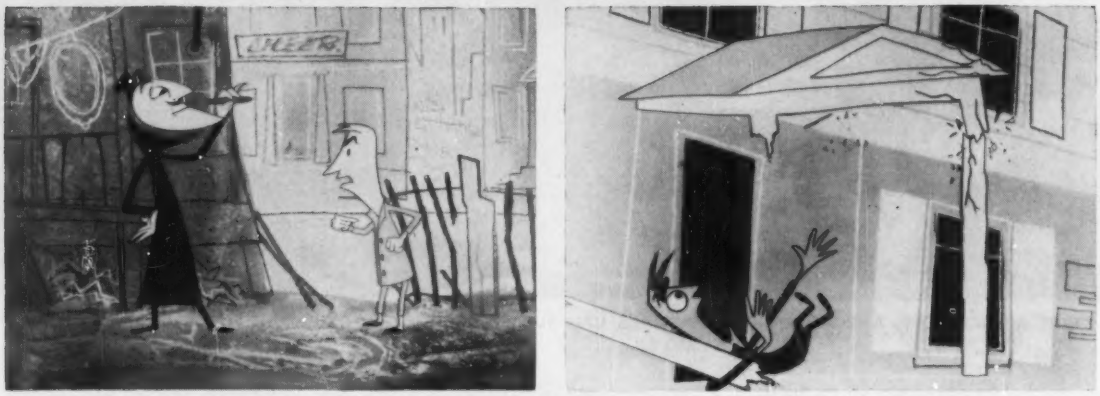
Alexander M. Beebee, president, Rochester Gas & Electric Corp—"We in Rochester Gas & Electric Corp are wholeheartedly and enthusiastically behind the ACTION committee and have contributed to its financial support. A Rochester Housing Authority and Rehabilitation Commission has been appointed by our city manager to implement the objectives of ACTION and one of our own executives is represented on it. . . . . We are continually encouraging our own employees to participate in civic developments like this. We are doing this because we firmly believe that whatever is good for our community is also good for our company."

Merrill E. Skinner, vice president, Union Electric Co of Missouri—"Every large urban utility has thousands of customers residing in antiquated dwelling units and doing business in obsolete buildings. The ACTION program of community self-improvement should contribute extensively to the modernization of these old structures. Today any modernization includes electrical modernization."

R. M. Watt, president, Kentucky Utilities Co—"Our community development program has brought increases in revenues as the economy of the area was improved. Community improvement helped expand trading areas, attract new industries, and provide new payrolls which resulted in increased industrial, agricultural, commercial, and residential revenues and customers. Helping people improve their economy has proved to be an excellent public relations program."

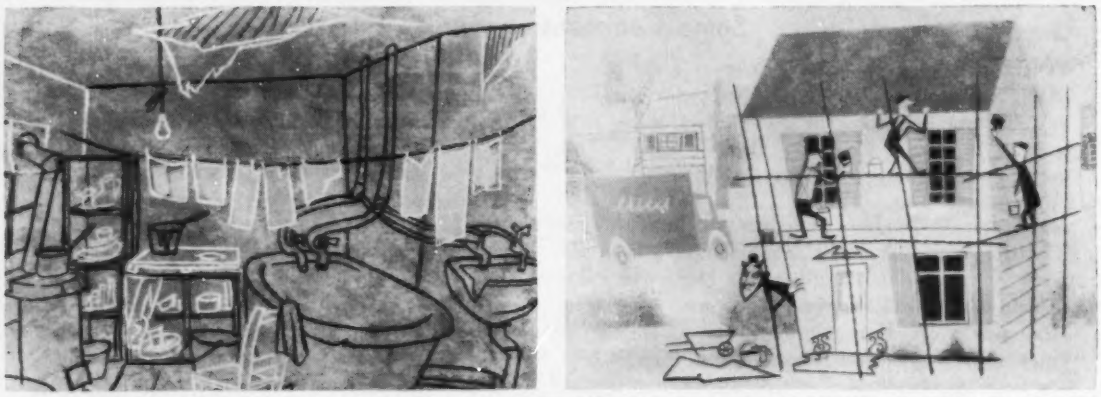
J. Reed Hartman, vice president, Cincinnati Gas & Electric Co—"Members of the electrical industry have an excellent opportunity to invest in the future prosperity of their business and the future well-being of the nation by supporting ACTION."

"Man of ACTION," A Cartoon Film to Arouse the Public



DEVIL'S PROJECT SUPERVISOR OF THE DIVISION OF URBAN DESTRUCTION FEEDS ON NEGLECT THAT RUINS HOMES;

HELPS TURN THE ONCE BEAUTIFUL NEIGHBORHOODS INTO SLUMS. SUCH CROWDED CONDITIONS, RESULT OF SLUMS, FIND



INADEQUATE PLUMBING, ELECTRICAL AND OTHER FACILITIES. BUT MAINTENANCE AND REPAIR KEEP DEVIL ON THE RUN

The above stills are from "Man of ACTION," a film which features the current model of public enemy number one—the Devil's project supervisor, Division of Urban Destruction.

This 13½-minute color cartoon is now available nationally. It was produced by Transfilm for the American Council to Improve Our Neighborhoods and contributed as a public service by Continental Can Co. It is a key tool in the organization's drive to stop the deterioration of America's homes and neighborhoods.

The Devil's accomplice, a symbol of the citizen apathy which has made housing decay our prime social and economic problem, barely has to lift a finger to create slums. In an entertaining way, he demonstrates how people themselves do the Devil's work.

"Man of ACTION" is available on free loan in 16 mm to adult community groups, industry, and TV stations through Association Films' regional libraries.

Operation Demonstrate—
A Blueprint for Communities

Operation Demonstrate is a practical and comprehensive effort to show Clevelanders how they can remodel and improve a marginal house and turn it into a desirable, functional home. It offers other communities a demonstration of how to arouse interest among their own people.

It has done this by actually remodeling, redecorating, and improving a number of demonstration houses located in urban Cleveland. The public has been invited to visit these houses over a period of several months, and at the site is being distributed literature on the costs of remodeling, where to begin, and how to finance the project. Because graphic examples of finished homes are being shown, it is the purpose of Operation Demonstrate to inspire home owners, prospective buyers of urban real estate, builders, architects, and city planning officials.

Not Slum Clearance Venture

Operation Demonstrate is not a slum clearance venture. Its first purpose is to take marginal city property, which when it and the area around it is improved, becomes valuable property. This is the kind of property which if further neglected will slide into slums.

The problem of value decline and neighborhood disintegration in urban real estate is a national one. The population of every major city has been migrating to suburban areas. And with this home owner departure, otherwise desirable residential locations have been deteriorating rapidly. To meet this challenging problem, interested Cleveland citizens decided that their city could be the test ground for a major demonstration.

Special Group Formed

For this purpose, Cleveland Modernization, Inc, a non-profit urban development group, was founded. With an advisory committee representing broad diversification of civic interest, Cleveland Modernization, Inc, outlined a specific program of demonstration, promotion and community activities to sell the value of renovating borderline residential properties. Financial support for the project was secured from many local industries, building materials trade associations, and local home builders.

Plans called for 12 example houses, chosen for their location, era of construction, and general condition.

The properties were purchased by sponsoring builders, realtors, dealers, and financial institutions or associations. Most sponsors worked under the guidance of a national magazine. The housing editors of these magazines, working with architects of their own selection and with local dealers and department stores, were responsible for the design plan, decoration and furnishing of these houses.

One pair of houses was moved to Public Square, Cleveland. The modernization of one of these was undertaken by the local American Institute of Architects chapter working with the local NAHB and NRLD chapters. This project was in the nature of a dream modernization, employing latest available standard materials and equipment. The purpose of "Home on the Square" was to excite a maximum amount of interest in the 12 housing projects. The end result, it is hoped, should be an upgrading of housing, generally, in Cleveland.

Promotion Backs Project

The public's attention to the examples is being promoted by an intensive campaign using newspapers, radio, television, car cards, and posters. The public is invited to visit the demonstration houses to see what can be done and to learn how to go about improving their own homes. Stores and banks have lent display help. Folders and booklets were printed to help people make their own plans for better homes.

Continuous, forceful promotion is being carried on to alert the entire city to the need for rehabilitation and how to find a way to do it.

Special Events Planned

A series of spectacular events is being staged during the duration of the project. The purpose of these events is to attract civic leaders, government people, builders, architects, designers, and building material dealers from all over the country. The events also will be covered by newspapers, magazines, TV and radio.

Special educational programs have been arranged to teach the citizens of Cleveland about good design, construction, finance, and neighborhood hygiene.

Requests for information concerning Operation Demonstrate can be sent to Joseph Guillozet, 1740 East 12th Street, Cleveland, Ohio.

From Cleveland's Experience Comes This Advice

Two major pieces of advice stem from the Cleveland experience with Operation Demonstrate for other cities which may want to try a similar demonstration. These are:

- **Make sure your city has a remodeling code. Absence of such a code can lead to unnecessary red tape and delays. If no code exists, initiate the necessary group action to bring about a modernization code.**
- **Demonstration projects should be on a commercial basis so that trades and building supply people can support them through advertising with the hope of an eventual return in the form of improved business.**

BEFORE

AFTER

Operation Demonstrate Proves Remodelling Pays

Address: 2013 Freeman Avenue
Sponsored by: Real Estate Board
Purchase Price $5,300
Remodelling Cost $2,500
Total Cost $7,800
Present Evaluation $10,800

Address: 4005 Woodbine Avenue
Sponsored by:
Home Builders' Association
Purchase Price $7,075
Remodelling Cost $3,500
Total Cost $10,575
Present Evaluation $11,500

Address: 1925 East 86th Street
Sponsored by:
Lumber Dealers and
Parents Magazine
Purchase Price $11,500
Remodelling Cost $6,500
Total Cost $18,000
Present Evaluation $21,000

Operation Home Improvement—Giant Promotion

Operation Home Improvement, the year-long, industry-wide campaign to make 1956 Home Improvement Year, expects to become the biggest sales promotion effort in the annals of American business. Initiated by the United States Chamber of Commerce only a few months ago, the campaign has quickly gained the support of all leading building materials and home equipment producers as well as all of the trade associations whose members are in any way connected with home improvement.

Operation Home Improvement has two principal objectives:

1. To encourage more homeowners to improve their homes.

2. To make it easier for homeowners to buy the materials and services that go into home improvement.

Basically, the campaign coordinates the selling and promotion efforts of all elements of the building materials, home equipment and financing industries at both the national and the local level. It is completely commercial, and every participant has profit uppermost in mind.

On Jan. 16, Albert M. Cole, Administrator of the Housing and Home Finance Agency, will proclaim 1956 as "Home Improvement Year." From then on, the homeowning public will be barraged from every quarter with the Operation Home Improvement message—" '56 . . . the year to fix." The Operation Home Improvement seal is expected to appear in tens of millions of dollars worth of national advertising.

Locally lumber dealers, savings and loan associations, banks, plumbing, heating, and wiring contractors, and everyone else in the industry will be using the seal in newspaper advertising.

Of special concern to electric utilities in this home improvement drive will be kitchen and laundry remodelling, lighting, heating and air conditioning, upgrading of water heaters, and improvement of wiring. Operation Home Improvement can provide a means for utilities to make sure that electricity plays a prominent role in the home improvement drive.

To facilitate concerted local promotion, the Operation Home Improvement staff has prepared a basic advertising and display kit, available for $5.

Through the complete cooperation of all elements of the home improvement industry in this promotional campaign, industry leaders feel that the big home improvement market can be increased by many billions of dollars this year.

To further its second objective—that of making it easier for the homeowner to improve his home—Operation Home Improvement has developed a pattern for local activity by the home improvement industry. It is suggested that all

(*Continued on page* 86)

What the Electrical Industry Can Do

The electrical industry—utilities and manufacturers—will find it decidedly to their advantage to take the lead in local implementation of the Operation Home Improvement program in their areas.

They can do this by:

1. Working with the Chamber of Commerce and other groups to encourage the creation of a local promotion akin to the national Operation Home Improvement efforts.

2. Ensuring that electrical living becomes synonymous with home improvement.

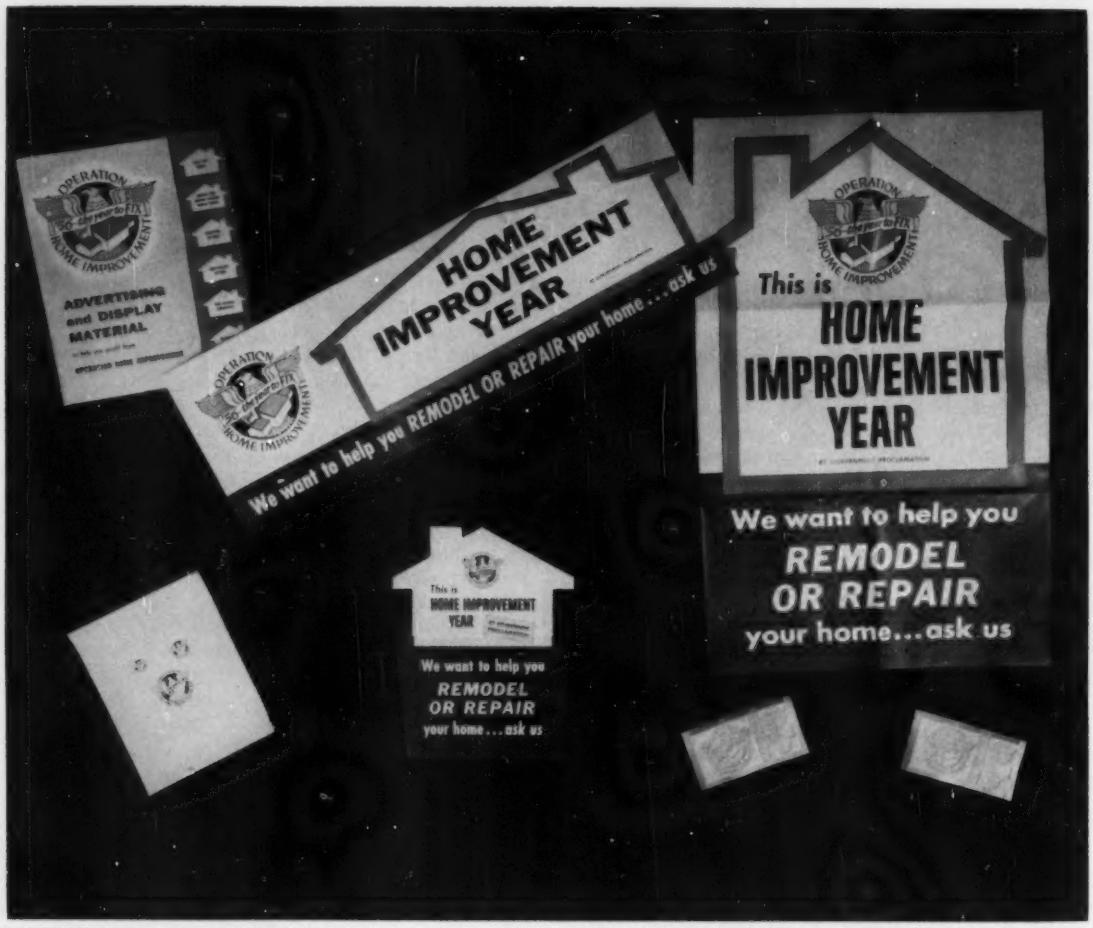
3. Ensuring that improved electrical wiring, electrical modernization of kitchens, laundry, water heating, and improved lighting are not omitted from any local home improvement promotions.

4. Making sure that they are on the Operation Home Improvement news-letter list so that they will be kept abreast of developments in this campaign.

5. Planning to use the Operation Home Improvement seal and to support the Home Improvement Year theme in all of their advertising after Jan. 16.

6. Using the seal and the general message in all of their other promotional activities, such as direct mail, displays, etc.

7. Being prepared to respond to the increased demands for services the campaign will create.


OPERATION
ADVERTISING and DISPLAY MATERIAL
HOME IMPROVEMENT YEAR
We want to help you REMODEL OR REPAIR your home... ask us
This is
HOME IMPROVEMENT YEAR
We want to help you
REMODEL OR REPAIR
your home... ask us

OHI PROMOTION KIT INCLUDES NEWSPAPER AD MATS, DECAL, RADIO AND TV COMMERCIALS, INFORMATIONAL BOOKLET

OHI—Giant Promotion

(*Continued from page* 85)

elements of the local home improvement industry, through the Chamber of Commerce, join forces and cooperate on a community-wide promotional campaign.

Through cooperation, dealers, contractors, architects and lenders can arrange for a local government official to proclaim a Home Improvement Week or Month, open up a home improvement information center—perhaps in an actual remodelled house—and urge all homeowners in the community to come to the center to get their questions answered.

Operation Home Improvement is being financed on an operating budget of $100,000 made up of contributions from industry based on $5,000 for every $100,000 in gross sales, or less proportionately, but no contribution can be more than $5,000.

The National Adequate Wiring Bureau will begin first of a series of tie-in ads with Operation Home Improvement in the Feb. 7 issue of Look Magazine. At the same time the industry will observe "National Electrical Week."

FHA Encourages Home Improvement

Federal Housing Administration Commissioner Norman Mason at a recent meeting to hear about Operation Home Improvement said the government is interested in seeing that neighborhoods are kept from becoming static, run down, and typed. When they do become run down, he pointed out, the government cannot issue mortgages in these neighborhoods.

Because of the Administration's interest in seeing Operation Home Improvement become a success, Mason said, his office will recommend to the incoming Congress that Title 1 home improvement loans of the FHA Act be made a permanent activity of the FHA, that Title 1 loans be increased from present $2,500 limit, and that terms of payment be lengthened from the present three years.

GENERATION—Operation

Canal Gates Are Controlled Automatically

EDWIN L. HAMILTON, Supervisor of Electrical Department, Central Nebraska Public Power and Irrigation District, Gothenburg, Neb.

Automatically controlled electric motor drives now regulate the check gates on the supply canal operated year round by the Central Nebraska Public Power and Irrigation District to serve three hydroelectric power plants (see EW, Aug. 22, 1955, p 121). The canal also serves for summer irrigation.

The check gates were installed when the canal was built about 1940, but as power supply was not readily available then, manual crank mechanisms were installed on the gates. Such manual operation could only approximate a constant water level, so important in minimizing maintenance of dirt canal banks. Consequently, when a source of power became available, electric motor drives with automatic controls replaced manual operation.

Operation Reversible

A capacitor-type, single-phase, 120/240-v, 60-cps, 1½-hp motor now provides reversible operation, and fluid drive affords the necessary slip when the gate sticks, freezes, or runs through the limit switches which restrict the raising and lowering of the gates. A magnetic brake holds the gate position while the motor is idle.

The electric motor drive mechanism can be controlled manually or automatically. Automatic control of the gate is by means of a float switch at a float well some 100 to 200 ft upstream. The float switch is of special design, consisting of a small shaft on which a pulley for the float tape and a cam are mounted. The cam operates three micro switches.

Blocks Limit Tape

The float is attached to a steel tape with perforations every 0.2 ft. The pulley over which the tape runs is 1 ft in circumference and has small spikes matching the tape's perforations. The float is balanced by a weight, and the motion of the tape is limited by the blocks on it.

The cam which moves with the float is about 1 ft in circumference and has a slightly raised section which operates the micro switches according to the level of the float. A time switch, permitting the gate to move only a short distance at a time, eliminates possible hunting action.

Water flow at the diversion dam and power plants fluctuates rapidly, and as the water continues down the canal its fluctuations are smoothed out. Short-interval time switches upstream and long-interval switches downstream match the water fluctuations. Blocks on the steel tape stop the cam from passing the point where at least one control switch is closed. When water level is abnormally high or low, the switches remain closed to correct the water level.

Water Level Closes Switch

Automatic operation is as follows:

1. As water level rises, the cam of the float switch turns to close the raise micro switch. Water level must rise about 0.1 ft to close the switch.

2. With the raise contact closed, the magnetic contactor and the motor operate only as long as the time switch is closed. The time switch may go through its cycle several times before the gate is raised sufficiently to lower the water level to normal.

3. When water level returns to normal or nearly so, the cam turns

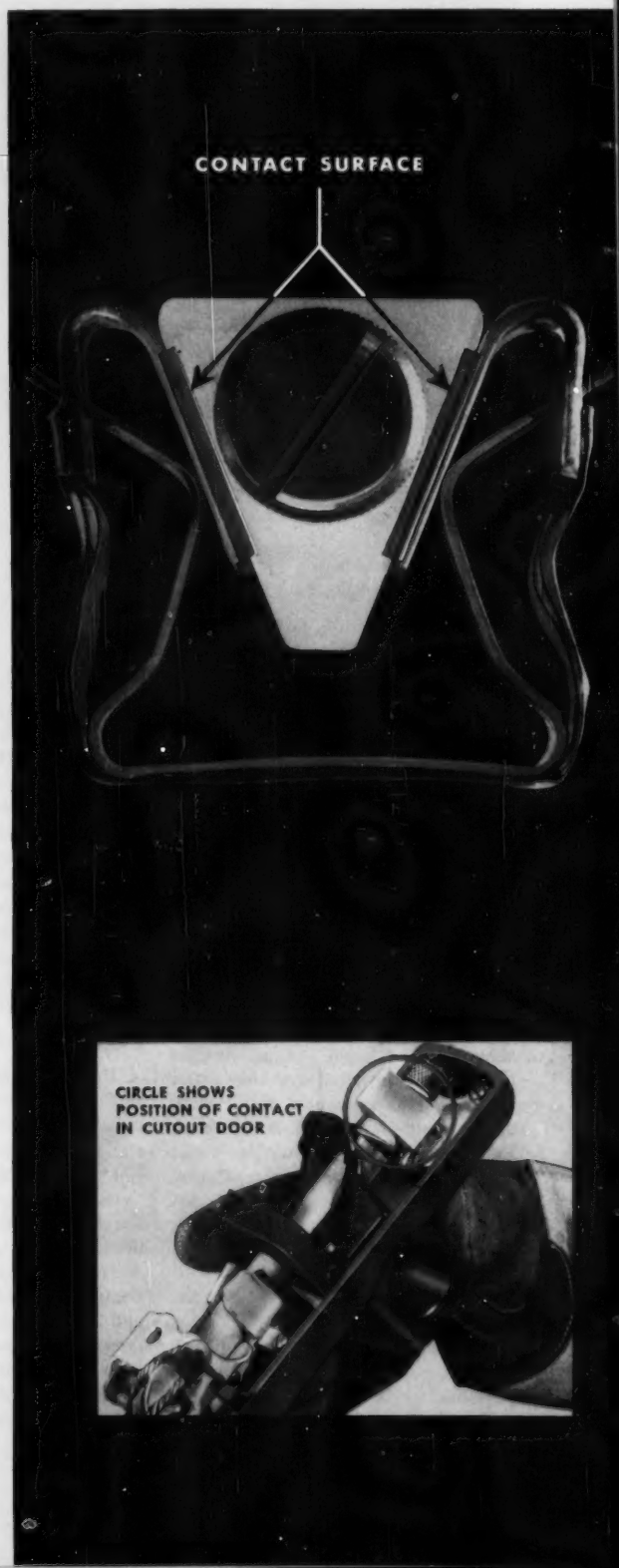
(*Continued on page* 92)

old

Ball-point contacts hit on only one spot. Can result in pitting, wear, corrosion—and possible overheating.

new

"V"-wedge contacts line up solidly, both sides . . . make for a high-pressure, multi-point, low-resistance contact.



ALL-NEW ENCLOSED FUSE CUTOUTS

now...

Self-aligning 'V'-wedge contacts have multi-point contact surfaces, add years to cutout life

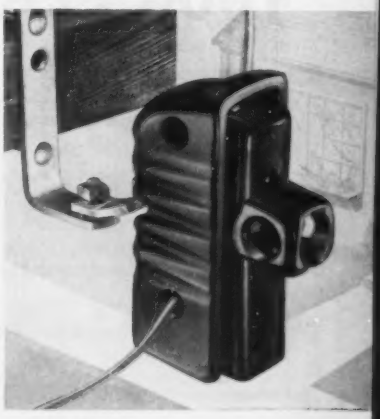
Cutout life is extended in General Electric's all-new Enclosed Fuse Cutout line because of this unique construction which gives positive high-pressure, multi-point, low-resistance contact. In addition, these exclusive "V"-wedge contacts are free-floating and self-aligning—to assure you of positive contact every time. Broad surfaces of contacts are silver plated to protect against corrosion and maintain low resistance.

EVEN AFTER YEARS OF SERVICE, the faces of these "V"-wedge contacts stay bright, clean, shiny. Resistance is kept low—and cumulative overheating doesn't even get a chance to cause an outage.

In old-style contacts, pitting, arcing and overheating could result from single-point contact—G.E.'s completely new "V"-wedge contacts eliminate these difficulties.

EVERYTHING IN ONE LINE—G.E.'s new Fuse Cutout line gives you all functions—indicating-dropout, indicating-non-dropout, disconnect—in one basic design. You get two current ratings, 50 and 100 amperes, and two voltage ratings, 5.2 and 7.8 kva, to match every possible system demand.

LINEMEN WILL LIKE the other new features of the new G-E Fuse Cutout line. The safety-grip door handle, for instance, that ends switch-stick juggling—and the unique plastic-to-metal latching that prevents door "freezing." In addition, fusing and line connecting have been made extra easy for fastest possible installation and servicing. For a complete description of the new cutout line, write for Bulletin GEA-6208, General Electric Company, Section 433-13, Schenectady 5, New York.

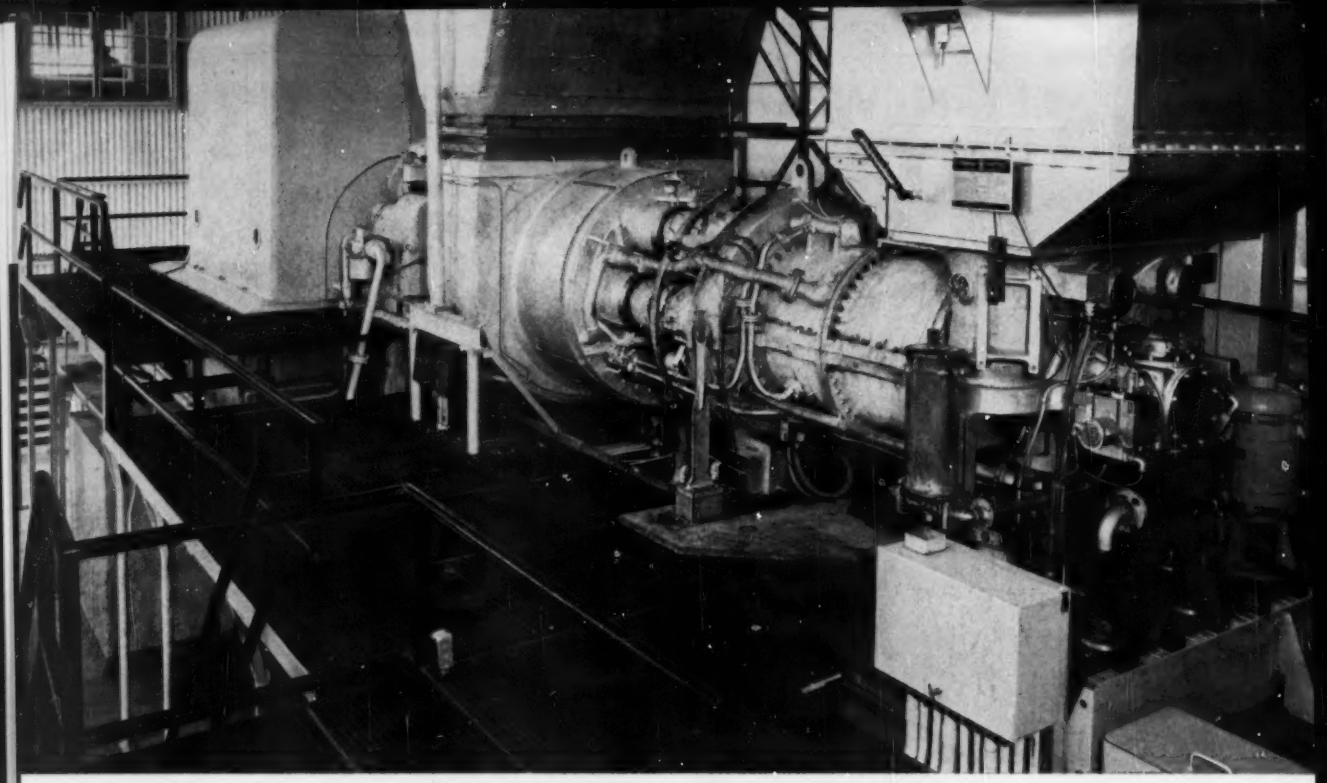


THIS NEW G-E FUSE CUTOUT

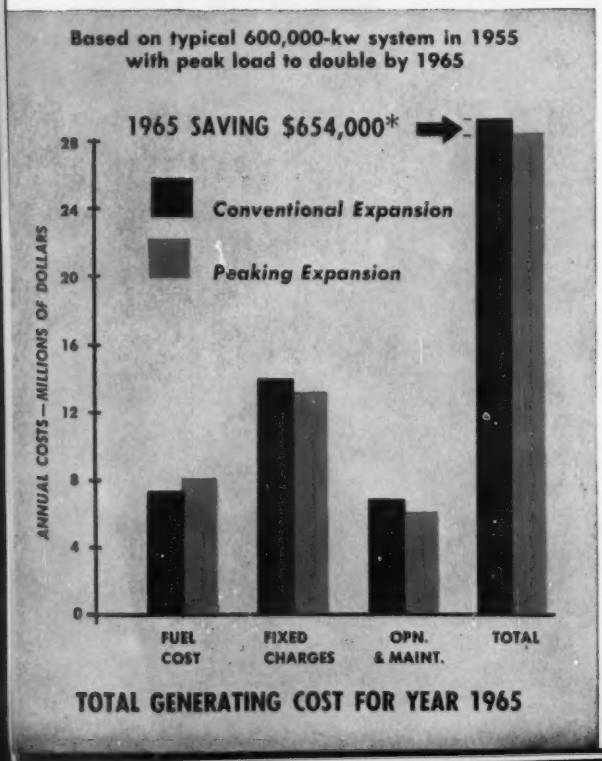
has all the features most engineers and linemen prefer. Logically so, too—hundreds of reports of the features they wanted were collected and evaluated. Their best ideas were incorporated into the new cutout design.

Progress Is Our Most Important Product

GENERAL ELECTRIC



HOW G-E GAS TURBINES CAN REDUCE YOUR PEAK LOAD GENERATING COSTS

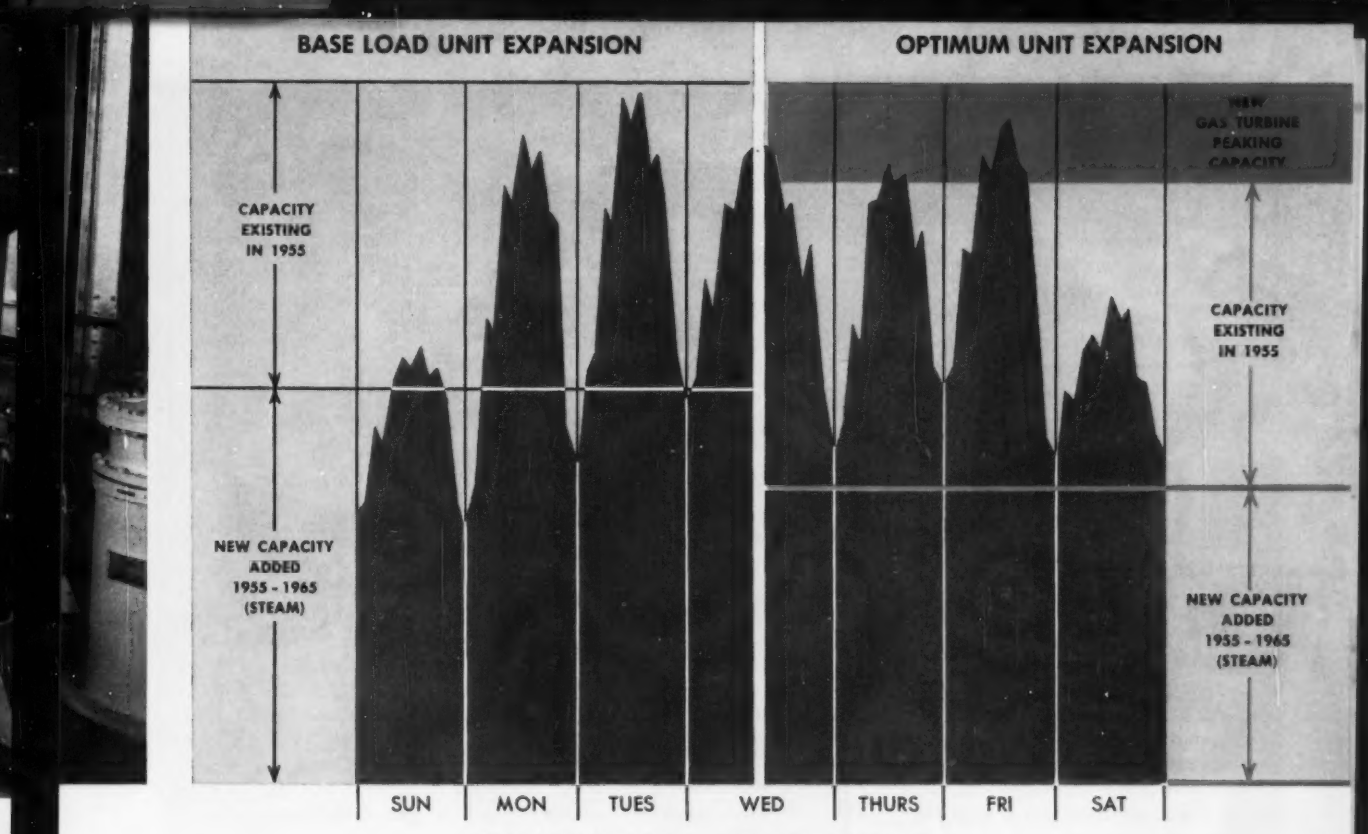


Growing peak loads point up need for this new capacity expansion plan

Throughout the nation, rapidly growing peak loads are posing serious problems for utilities. For instance, increased use of home and commercial air conditioning is largely responsible for a summer peak in the South which is now growing at twice the rate of the average peak. Skyrocketing sales of air conditioning equipment in the Northern sections indicate that utilities there will soon face similar problems. These growing peak loads point up the need for a careful examination of expansion plans.

THE CONVENTIONAL METHOD used by most utilities is the "base load unit expansion system." This system rests on the principle that the lowest total fuel cost results from operating the most efficient units on the base load portion of the system, and the least efficient on the peaking portion. All new capacity additions, consisting of high-efficiency steam turbines, are immediately placed in base load operation.

*Estimated saving.



TYPICAL 1965 LOAD CURVE

WEEK OF PEAK LOAD

A NEW METHOD of meeting increasing load demands is now receiving extensive study. It's called "optimum unit expansion" (see chart above). This method proposes that for any given system there is an optimum way to expand capacity, using both base load and low-cost gas turbine peaking units that will give the minimum total production cost, taking into account fuel, fixed charges, labor, and maintenance.

UNDER THE "OPTIMUM UNIT EXPANSION" PLAN, the normal and necessary expansion with steam turbines to cover increased base load requirements has been augmented by a small proportion of General Electric gas turbines used as peaking units. Because of the short duration of system peaks—100 to 500 hours a year—the efficiency of the peaking units is secondary to the major consideration—low installed cost per kilowatt. General Electric gas turbines may be installed from $20–$40 per kilowatt less than steam turbine peaking plants.

WHAT CAN THIS MEAN IN SAVINGS? The chart on the opposite page tells the story. By 1965 an *annual* saving of $654,000* would be possible for a typical 600,000-kw (1955) system using G-E gas turbine generators to handle peak loads as opposed to the conventional use of old steam turbine plants. This figure assumes that peak load will double by 1965 to 1,200,000 kw and that the assumed load duration curve does not change.

TO OBTAIN THIS ESTIMATED SAVING, three factors are taken into consideration: First, fuel cost is slightly higher for the gas turbine. Second, the G-E gas turbine reduces fixed charges because of its low installed cost. Finally, low labor and maintenance costs of the "optimum unit expansion" system give it a big advantage in savings.

Moreover, the "optimum unit expansion system" offers two additional areas for savings: First, strategic location of the gas turbine unit on a system can result in considerable savings in transmission lines. Second, remote-controlled gas turbine stations are feasible, thus helping to further reduce labor costs.

Obviously, this study is meaningful to you only in terms of your particular system. Load growth forecasts, fuel and labor costs, present equipment, and the nature of your load duration curve are all factors which would affect the over-all picture.

GENERAL ELECTRIC WOULD BE GLAD to discuss with you how your company can achieve maximum benefit from "optimum unit expansion." For more information, contact your nearest G-E Apparatus Sales Office, or write to General Electric Company, Section 261-11, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Canal Gate Control

(*Continued from page 87*)

back to normal, and the raise contact is opened. The gate is then positioned for the new flow, and water level stays constant within ±0.2 ft.

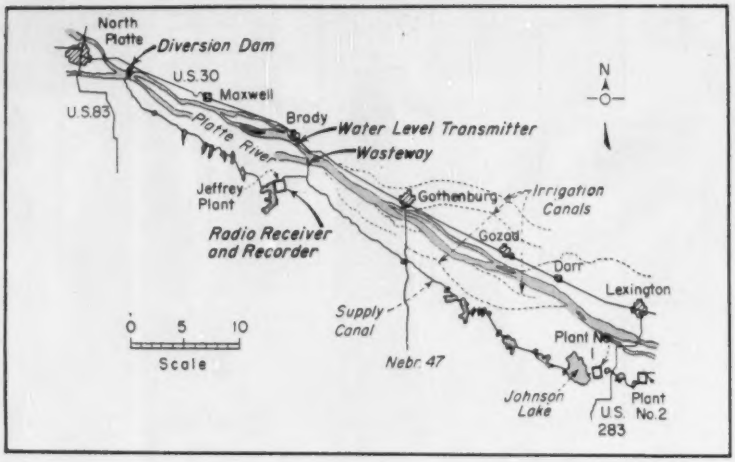
4. When the water goes down, the micro switch for closing the gate operates similarly.

5. Sometimes, because of ice jams, rapid load changes, or flash floods, the water rises too fast for the normal float switch micro switches and time switch control to keep up. When this occurs and the water level is as high as 0.4 ft above normal, a fast micro switch closes along with the raise switch. This shorts out the time switch.

6. The fast micro switch being closed, the gate moves continuously until the water lowers and the fast switch opens. When the fast switch opens, steps 1, 2, and 3 occur. In this way fast changes in water level are cared for safely. The fast switch works equally well for rapid drops in water level.

7. Limit switches act to stop the motor when the gate runs to one or other extreme. The lower limit switch allows some water to flow when power fails or the gate fails for any other reason to raise as the water rises.

The upper limit switch permits free flow, that is, the gate may lift out of the water.



Operation Satisfactory

Operation of the gates on automatic control has proved very satisfactory in all seasons. Although the gates freeze when unmoved for some time in zero temperature, they are easily chipped loose.

This equipment was installed on six canal check gates 30 ft wide and 15 ft high, and on the Johnson Lake inlet gate, 70 ft wide and 6 ft high. Automatic control was applied also to the canal gate at the Jeffrey wasteway and the river gate at the Johnson No. 2 wasteway. The wasteways are control points where water can be sent down the canal or back to the river.

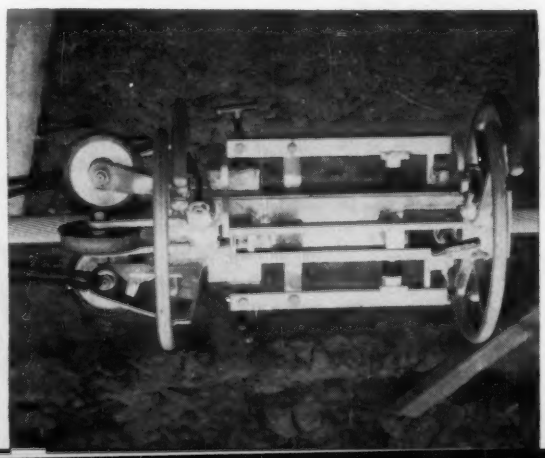
TRANSMISSION—Maintenance

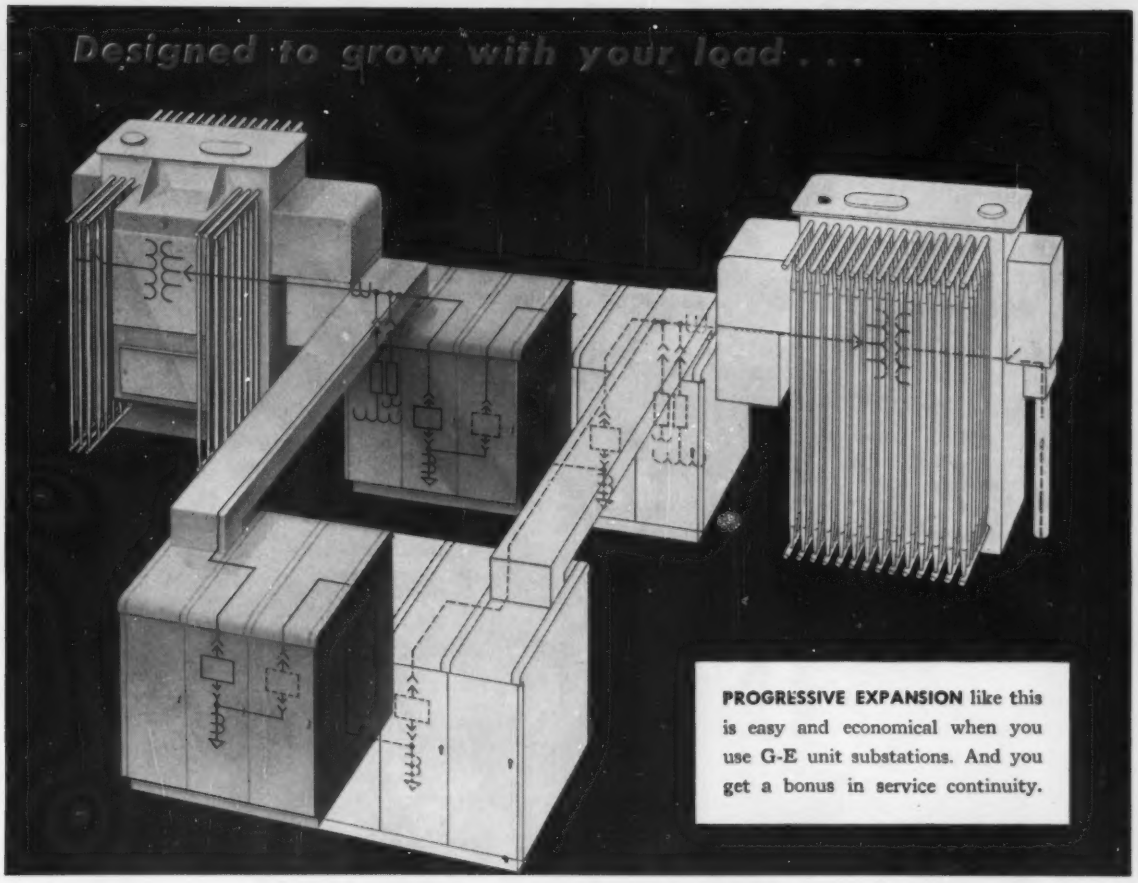
Polishes Abrasions on 345-Kv Conductor

Field polishing of conductor for Bonneville Power Administration's 345-kv circuits raises the corona-starting voltage level 10-20% above the maximum value for normally abraded conductor. The smoother surface of the conductor affords less opportunity for radio noise when the lines are operating at rated voltage. The polishing device is used on 1.602-in. ACSR (Chuckar) conductor as it is strung to smooth down nicks, pinpoints and scratches. It also may be used on energized conductor to polish rough or abraded spots.

Desirability of field polishing the 345-kv conductor was proved in laboratory tests made for BPA by Oregon State College. Samples of highly-polished conductors ex-

(*Continued on page 96*)




Designed to grow with your load . . .
PROGRESSIVE EXPANSION like this is easy and economical when you use G-E unit substations. And you get a bonus in service continuity.

This G-E unit substation expands easily from radial to double-duplex hook-up

Circuit arrangement permits:

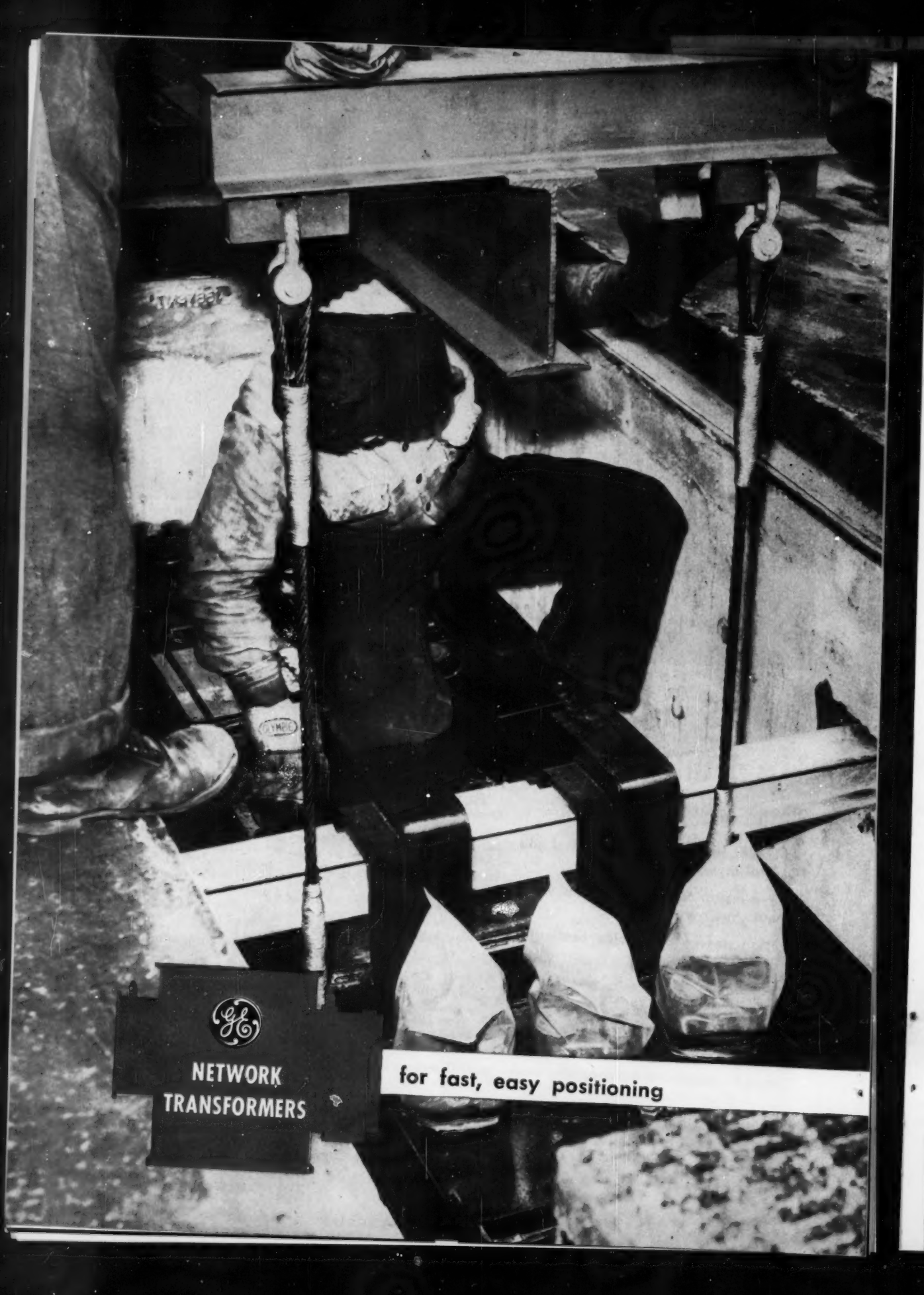
- **Lower equipment cost in initial and final installations**
- **Expansion to double-duplex without shutdown**
- **High degree of service continuity**
- **Bus regulation for each pair of feeders**
- **All switching performed by adequate circuit breakers**
- **Routine inspection and maintenance can be made without dropping load**

To meet growing loads, this General Electric two-feeder unit substation can be easily expanded into a double-duplex arrangement—a four-feeder substation that combines flexibility and service continuity with relatively low equipment cost. And this expansion is possible *without shutting down the substation.*

The double-duplex arrangement has the recognized advantages of the familiar "breaker-and-a-half" scheme at low cost per kva. The two normally open tie breakers with automatic throwover provide a high degree of service continuity. It is possible to remove either transformer or any breaker from service without dropping load. All switching operations involved are performed by adequate circuit breakers. Automatic-load-tap-changing equipment on each transformer provides bus regulation for each pair of feeders.

For more information about double-duplex, or other G-E unit substations designed to meet growing loads, ask your G-E apparatus representative for bulletins GEA-3800 and GEA-5847, or write to General Electric Company, Section 512-9, Schenectady 5, N. Y.

GENERAL ELECTRIC


NETWORK
TRANSFORMERS
for fast, easy positioning

NEW SUSPENSION MOUNTING

reduces positioning time for G-E network transformers to minutes instead of hours

A new design idea—suspension mounting—now greatly simplifies installation and maintenance of network transformers.

Developed jointly by General Electric and Consolidated Edison Company of New York, suspension mounting enables you to position a transformer in a fraction of the time formerly required. Vault floors need not be level. Furthermore, your construction men can quickly level the transformer since it is much easier to shim an I-beam cross bar before hanging a transformer from it than to shim a transformer after placing it on a vault floor. The Consolidated Edison men placed their first unit in position and levelled it in less than 10 minutes!

MAINTENANCE IS SIMPLIFIED, TOO

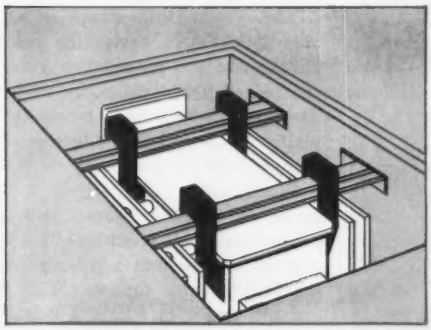
With suspension mounting, the transformer is 8 to 10 inches above the floor of the vault, away from corrosive elements such as sewage, dirt, and chemicals, which collect in most vaults. This retards corrosion of the tank, making it necessary to clean the vault far less frequently than when the transformer is set on the floor. When cleaning becomes necessary, it's easy to flush out the vault because there is clear passage under the transformer.

It's also easy to clean and repaint the transformer. Radiators are of the panel type, with large flat surfaces easily accessible from the top or ends. Just use a long-handled brush or nozzle.

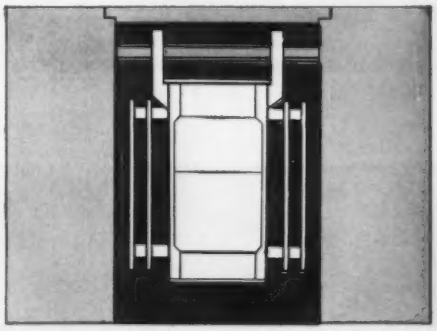
Maintenance is simplified in other ways, too. You can remove bushings, for example, from the outside of the tank. There are no large gaskets to replace. Accessories are located on the high-voltage end of the transformer where you can easily reach them. It's easy to inspect the network protector because it slides out on rails.

HELP FOR YOU

For help in solving your network problems and for complete information on the advantages of suspension-mounted G-E network transformers, see your local G-E sales representative. General Electric, Schenectady 5, N. Y. 435-6



SUSPENSION MOUNTING. Two sturdy hooks rest on I-beams installed above transformer. Each beam rests on bearing plate in side-wall recess.



PLENTY OF SPACE under transformer keeps it above chemicals and debris, retarding corrosion and permitting fast and easy cleaning of vault.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Polishes Conductor Abrasions

(*Continued from page* 92)

hibited a corona-starting voltage level of 270-280 kv. Ordinary scratches and abrasions dropped this level to about 200 kv. Samples dragged over rocks to simulate rough field handling had a corona-starting voltage level of about 150 kv. After polishing, the voltage level was raised to 250 kv or higher.

Hickory Blocks Are Paired

Polishing action is provided by drawing the conductor through two pairs of hickory blocks held tightly against the conductor. One end of each 1½x3x6-in. block is cut to match the outside diameter of the conductor. Blocks are cut perpendicularly to the grain so that grain lines in the curved surfaces lie parallel with the conductor.

Blocks are positioned in the polisher in opposed pairs, one pair at right angles to the other. They are mounted in aluminum guides on a 4x4-in. hollow-square hinged frame consisting of two aluminum angles. Each block is held under 100-lb pressure by a 2:1 lever that rides on a 50-lb standard Ford valve spring.

Pressure from the lever is transferred to the block through a steel adjusting screw. Each block is fitted with a steel cap which distributes pressure from the screw uniformly over the block. Proper pressure is maintained on the block by adjusting the screw so that the lever is level with a guide post next to the spring.

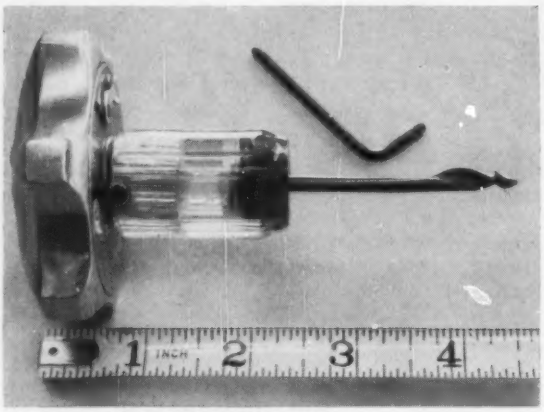
Rings Protect Polisher

A two-position catch in one position depresses the spring to allow removal of the polisher from the conductor. In the other position it unloads the spring to hold the block in place while the polisher is moved. Two quick-release, spring-loaded latches allow for easy opening or closing of the polisher around the conductor. All latches, adjusting screws, and catches are large enough to be operated by a man wearing gloves.

Circular guide rings of aluminum pipe attached to the polisher protect it from contact with the ground as it rides on the conductor. At the reel end of the device, aluminum guide pulleys with grooved neoprene tires guide the conductor between pairs of blocks. Total weight of the polisher is about 25 lb.

To polish conductor being strung, the polisher is positioned on the conductor between the cable trailer and the first tower. It may be anchored to the cable trailer or to two or more deadmen.

DISTRIBUTION—Construction



Simple Tool Drills Pilot Holes for Service Brackets Easily

CHARLES E. OSBORNE, JR, Senior Design Engineer, Texas Electric Service Co, Ft. Worth, Texas

Use of a low-cost tool for drilling pilot holes for service brackets by Texas Electric Service Co insures greater safety, provides a greater holding power for the bracket, and eliminates splitting of the wood on the customer's house.

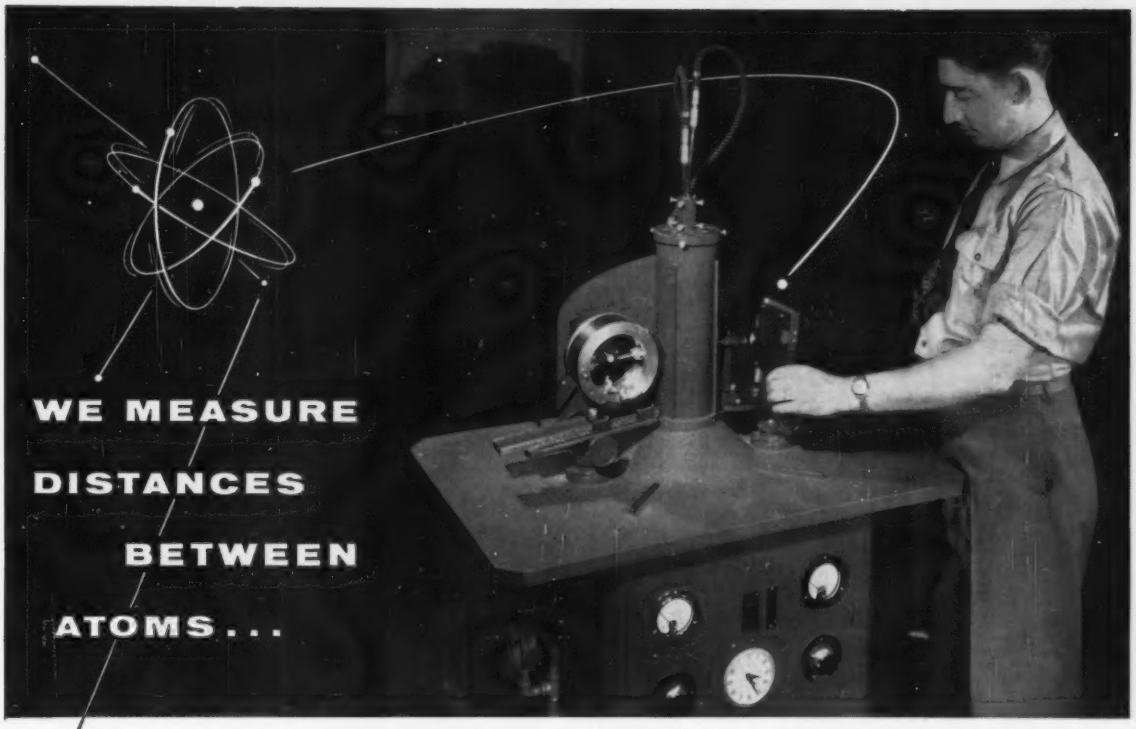
The simple drill, which is operated with one hand, consists of three parts: the ratchet handle, the plastic chuck, and the proper size gimlet. The ratchet handle is attached to the chuck by means of a set screw. And, the gimlet is held by a set screw in a steel insert in the plastic handle, to facilitate replacement when the gimlet becomes dull or broken.

When pilot holes are drilled, service brackets are easier to install; whereas, without the holes a higher driving torque is required. The higher torque is usually applied by inserting a 10-in. screwdriver in the eye of the bracket and turning. This sometimes shatters the bracket, presenting a hazard of lacerations to the workman.

If a pilot hole is drilled with a conventional drill, two hands are required. This presents another hazard because the workman cannot hold to the ladder or the house.

Tests have shown that the holding power of brackets installed in a pilot hole is greater than when they are installed without a pilot hole.

(*More How To on page* 102)

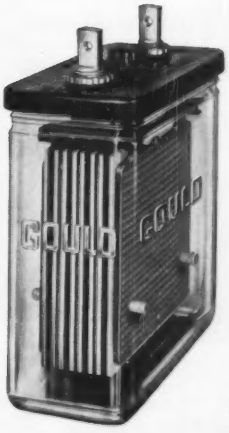


TO GIVE YOU *Advance Design* BATTERIES!

The X-Ray Diffraction Unit shown above is one of the few instruments of its kind being used in basic battery research. It identifies complex metallic compounds which cannot be identified practically by chemical means. It does this by actually indicating on film the distances between atoms, enabling Gould engineers to study atomic structure.

This instrument . . . this research . . . is revealing hitherto unknown facts about the relationship between molecular activity and battery performance . . . pointing the way toward more powerful, longer lasting active materials. That's why you get *better* batteries when you buy Gould!

For the full story on Gould Research, send for Booklet 749.



America's Finest!
GOULD PLANTÉ
The Aristocrat of
Stationary Batteries

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GOULD
Batteries

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

"BETTER BATTERIES THROUGH RESEARCH"

Always Use Gould-National Automobile and Truck Batteries

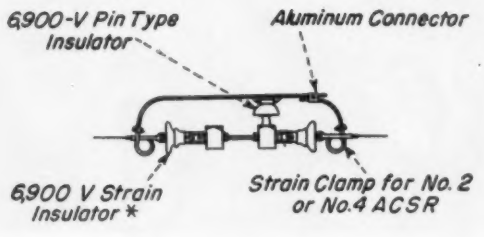
ENGINEERING REFERENCE SHEET

A Guide for Making Dead Ends and Angles In No. 4 and No. 2 Aluminum Wire (ACSR)

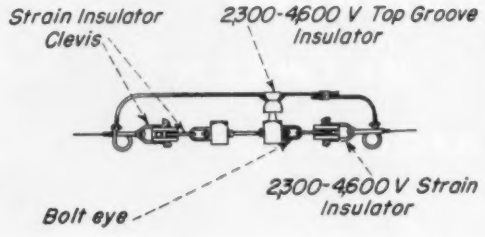
DISTRIBUTION
Design

Illustrations show how dead ends and vertical angles can be made when ACSR is used for conductors on circuits up to and including 12 kv. These illustrations are adapted from distribution practices of West Penn Power Co.

Dead Ends

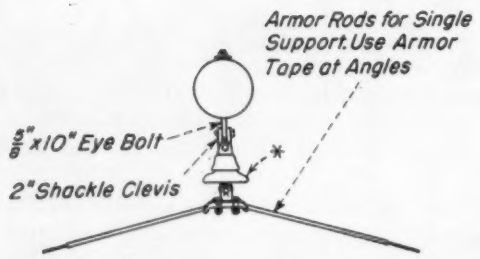


6,900 V Ungrounded

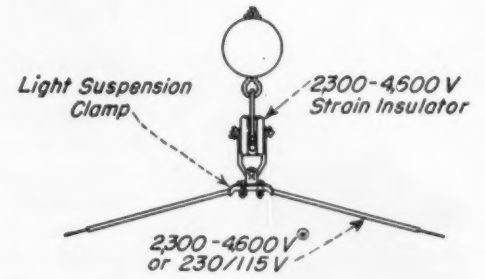


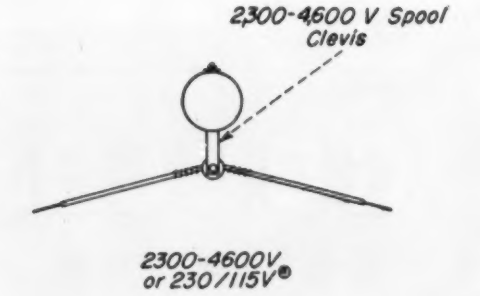
2,300-4,600 V†

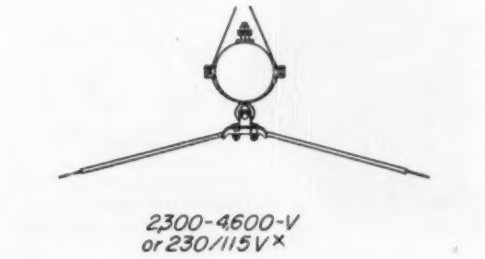
Vertical Angles



6,900 V Ungrounded

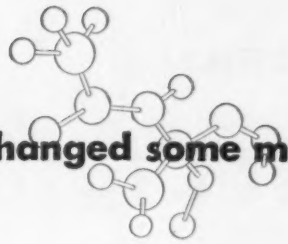




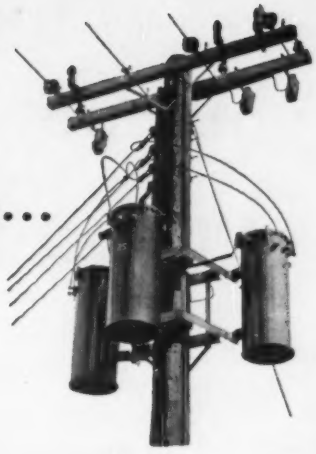


Notes

† Use armor tape at deadend strain clamps (If aluminum clamp body is used, omit armor tape).
* Use two 6,900-v strain insulators per wire for 8,000/4,600 v grounded and 12,000/6,900 v grounded.
⊙ Multiple grounded neutral when not connected to anchor guy.
× Multiple grounded neutral when connected to anchor guy.



Du Pont changed some molecules . . .



to produce the higher heat resistance of ALATHON®

polyethylene resin

From the Du Pont laboratories comes "Alathon" polyethylene resin with increased heat resistance for insulation and jacketing. This extra measure of protection for copper and aluminum conductors is in addition to other important properties, such as weatherability.

Jacketing of "Alathon" has outstanding dielectric strength. This material is lightweight and pliable; linemen find it easy to handle. Jacketing of "Alathon" provides real economy because it lasts for years without festooning or splitting. Another advantage is its low rate of water absorption.

For more property and application data on the family of Du Pont "Alathon" polyethylene resins, clip and mail the coupon below.

There is a difference in polyethylenes - specify ALATHON®
polyethylene resin

DU PONT

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Polychemicals Department
Room 351, Du Pont Building, Wilmington 98, Delaware

Please send me complete information on Du Pont "Alathon" polyethylene resins. I am interested in evaluating these materials for.....

.....

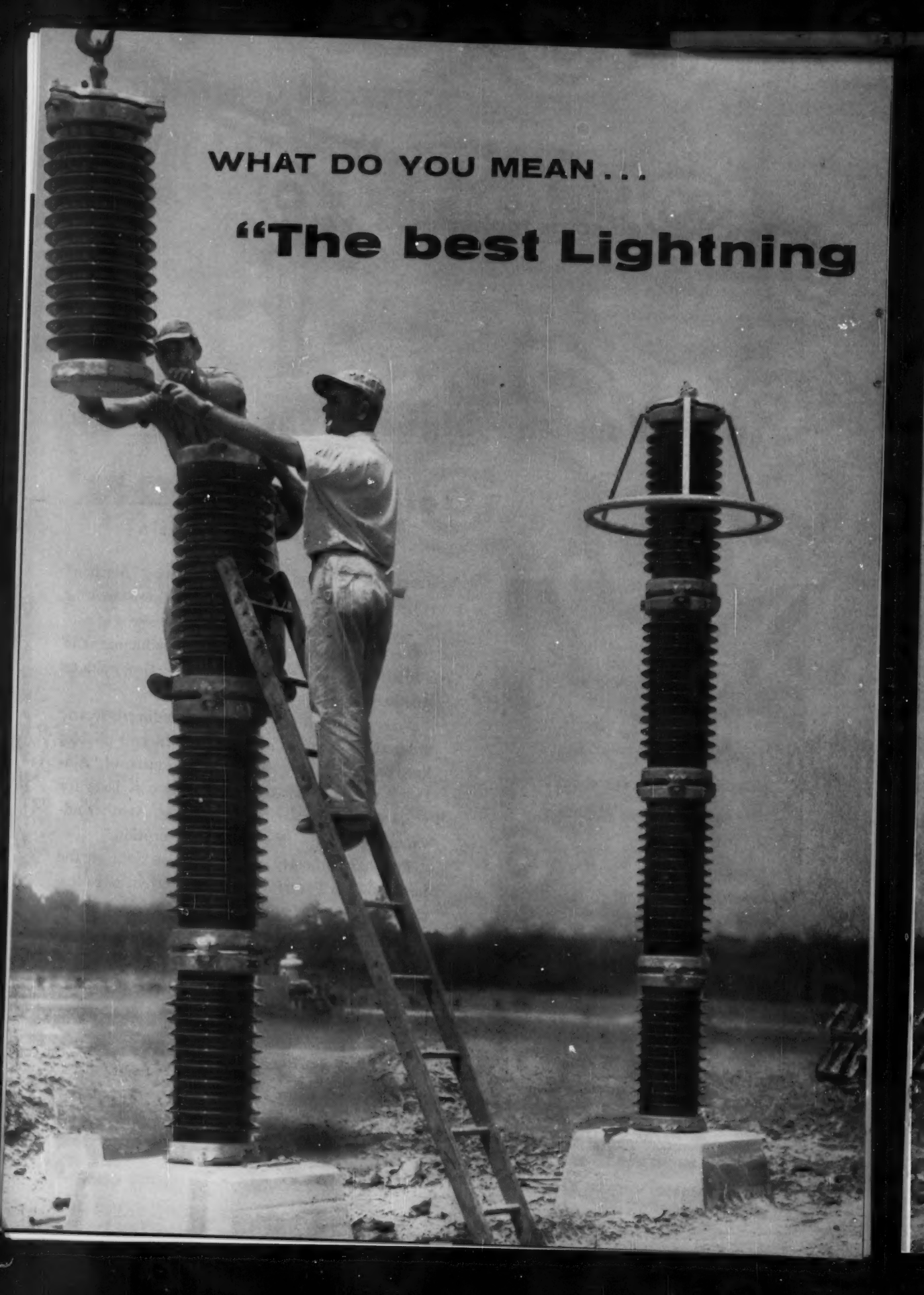
*Name*_____ *Position*_____

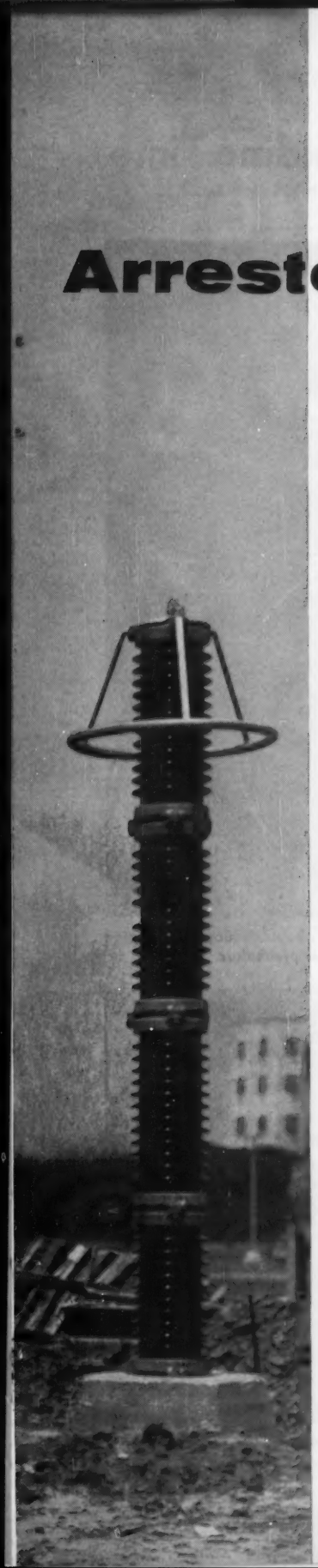
*Firm Name*_____

*Street Address*_____

*City*_____ *State*_____

*Type of Business*_____


WHAT DO YOU MEAN . . .
"The best Lightning



Arrester for half price!"

For high transmission voltages, Thorex MPR lightning arresters meet or exceed all present-day, top grade protective requirements, and include two very important extras:

(1) Internal grading provisions that protect the sensitive action of the arrester from the effect of conductive surface contamination that has, at times, been destructive to such devices *not* so-protected.

(2) Complete self-support at all transmission voltages, even those above 300 kv.

Let us talk about Point No. 2, for here is where dollars enter the picture.

Design, fabrication and construction of heavy, complicated steelwork and foundations to brace or suspend several tons of lightning arrester is a costly extra--and an unnecessary extra! It may total up to as much or more than the arrester, itself. It thus can double the installed price.

This premium in cost, moreover, provides absolutely no premium in protection. It may even carry with it less protection through a necessity for greater separation distance between equipment and its associated arrester. In fact, the Thorex with all its practical economies, gives you a fuller protection package. The performance premium is on the side of the dollar bargain. You get *both* with Thorex.

Put your own value on the simple, and exclusive, feature of self-support possessed by all Thorex arresters. Add to this the fact that Thorex is a superior protective device. Then make the obvious sound choice.

- - - - we will be seeing you.

OHIO BRASS COMPANY, MANSFIELD, OHIO

the heart of every *Ohio Brass* arrester

4631-H

Crane Used Inside Structure Cuts Building Time

E. W. ROBINSON, Chief Engineer, Generating Plant Design, Southwestern Public Service Co, Amarillo, Texas

Erection time was reduced during the building of Southwestern Public Service Co's Steam Plant X by applying two practices. Through the use of a crane inside the boiler structure to lift and position material and equipment, about 40 days of erection time were saved. Other savings in time and greater convenience followed the spotting of welding facilities at ground level and the providing of outlets for these facilities at various boiler levels.

Crane at Ground Level

The crane, a 20-ton crawler type, was used following erection of all boiler structural steel, hanging of main steam drum, and placing of roof tubes and casing framing steel. It was positioned in the boiler structure at ground level directly under the ultimate location of the furnace.

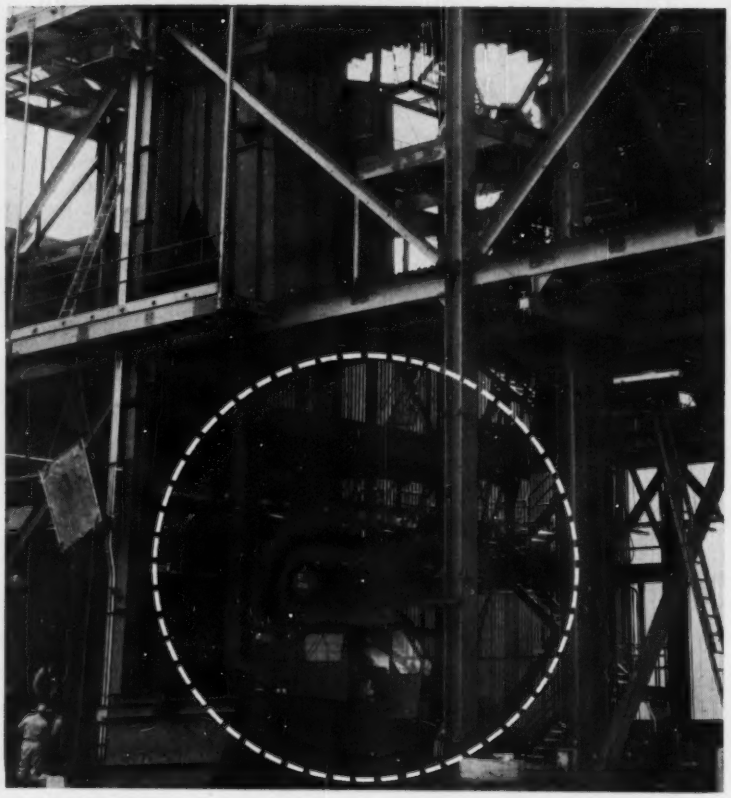
Then the crane and a 12-man crew placed and securely attached all hot-air and hot-gas ducts in five working days. This time does not include final alignment and seal welding, which was done later. Nevertheless, it would have taken a 12-man crew about 25 days to erect the ducts if the furnace installation had preceded the duct work, as is usual practice. In addition, several air-driven hoists would have been required.

Placed Tangential Burners

It is estimated a similar 80% reduction in time was effected by using the crane to set the 30-in. mud drum and 10-in. downcomers. The crane also was used to place the four tangential burners. This took only two days, as contrasted with seven days required without a crane on previous and similar jobs. Considerable time was saved by erecting the lower level steel to a point where air preheaters could be set with the crane. Then the upper steel levels were erected.

Another time saver involved the spotting of acetylene and oxygen cylinders and electric welding ma-

(*Continued on page* 107)



CRAWLER CRANE inside the boiler structure saved about 40 days of erection time by lifting and positioning ducts, burners, and air preheaters.

WELDING MACHINES placed at ground level had outlets at several boiler levels

1 **Built-in Provision for Load Growth**

2 **Flexibility... Unequal Ranges Available**

3 **Simplified System Maintenance**

NOW-

all Allis-Chalmers Voltage Regulators give you the

Vari-Amp Feature

Every Allis-Chalmers regulator now has five steps over which current capacity can be increased by reducing the range of regulation. To get more capacity, just reduce the range of regulation by changing the *Vari-Amp* setting.

To get the story

on the *Vari-Amp* feature on all three types of Allis-Chalmers voltage regulators,

turn the page

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

A-4804

For Bus Regulation

Vari-Amp Feature Provides for Load Growth

The *Vari-Amp* feature on Allis-Chalmers three-phase power regulators makes possible considerable economies for bus regulation. Whenever greater regulator current capacity is needed, it can be obtained by reducing the range of regulation. Then, transformer tap can be changed to obtain desired voltages.

In effect, the regulator has several ratings, making it possible to meet changing conditions caused by adding transformer capacity, increasing transformer ratings by addition of forced air, or transfer of a regulator from one substation to another.

An example of applying three-phase regulators with the *Vari-Amp* feature to a substation is shown in the box below. The *Vari-Amp* feature permits increasing rated bus current from 100% to 126% and the bus voltage may still be varied from 95% to 110%.

Above: *Vari-Amp* will provide important economies for bus regulation on installations like this. Below: Example shows rating increases for one type of system.

	Without Vari-Amp	*With* Vari-Amp
Transformer Voltage	100%	105%
Regulator Range	±10%	+5%, −10%
Bus Voltage	90% to 110%	95% to 110%
Rated Bus Current	100%	126%

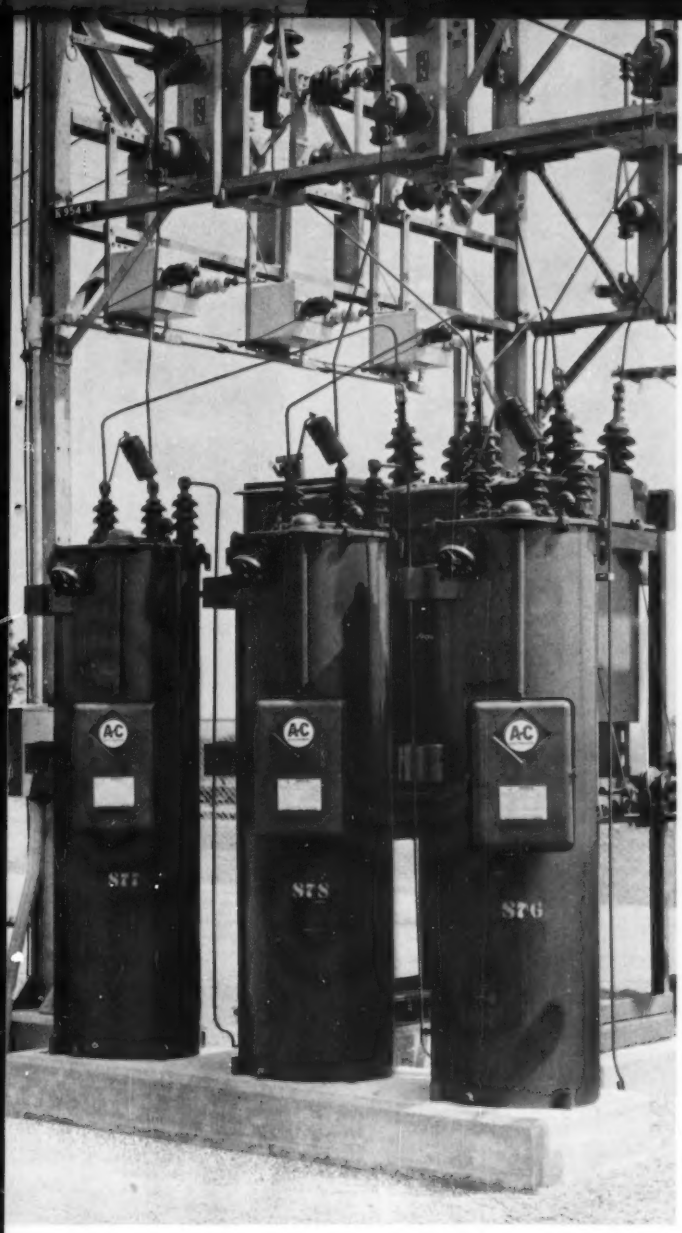
1 — Built-in Provision for Load Growth

The *Vari-Amp* feature on every Allis-Chalmers regulator means you get five ratings from a single regulator. By reducing the range of regulation, you can increase current ratings. You get more uses for each Allis-Chalmers regulator with this built-in provision for load growth.

2 —FLEXIBILITY... Unequal Ranges Available

Unusual flexibility is now available in Allis-Chalmers regulators because you can obtain unequal ranges of regulation in either direction. If your system requires, you can increase capacity in one direction by reducing range of regulation while leaving the capacity and range of regulation in the other direction unchanged.

ALLIS-



For either substation or feeder regulation, the *Vari-Amp* feature permits designing regulator operation to meet specific system needs.

For Distribution Regulation

Vari-Amp Feature Lets You Tailor a Unit to Your System's Needs

Since regulation requirements of different systems—and even on different parts of a system—vary greatly, addition of the *Vari-Amp* feature to Allis-Chalmers distribution regulators opens new possibilities for tailoring a unit to fit various requirements. In the past, it was necessary to use ± 10% regulation regardless of the needs of the system. Now you get exactly the range of regulation you need and, in many cases, a sizable "extra" in more current-carrying capacity.

On distribution regulators, the *Vari-Amp* feature lets you increase ratings as much as 60% in five steps from ± 10% range down to ± 5% range. You get considerable flexibility through use of unequal ranges of regulation. For example, you can set for 6¼% raise to get 135% current, and 10% lower at 100% current.

Best of all, this important feature is on all Allis-Chalmers regulators. You get more uses, more capacity for each regulator.

3— Simplified System Maintenance

Planned outages to inspect or maintain equipment will be easier, far less costly in overtime manpower. Because Allis-Chalmers voltage regulators with the *Vari-Amp* feature can carry so much more load, it is easy to shift the extra load to them during the week instead of during light load periods on Sundays and holidays. The same advantages make it easier to cope with unexpected emergencies, because the *Vari-Amp* feature lets Allis-Chalmers ⅝% step voltage regulators carry more load when other circuits cannot be used.

★ Originators ⅝% Step Regulation

CHALMERS

A-C ALLIS-CHALMERS

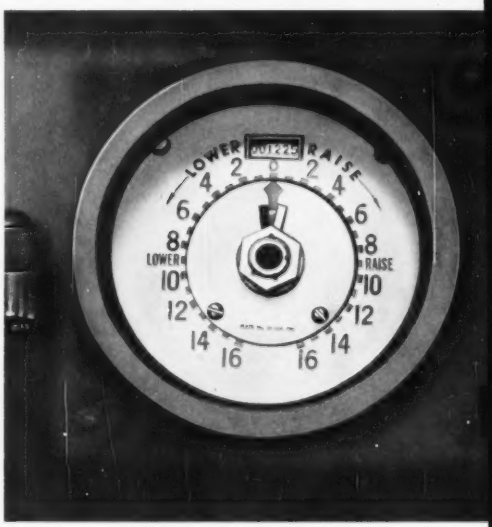
***Vari-Amp* Feature**
IN OPERATION FOR 15 YEARS

On Single-Phase Power Regulators

ALLIS-CHALMERS
5/8% STEP VOLTAGE REGULATORS

. . . from a utility engineer's report

"Vari-Amp Feature Lets Relay Man Change Ratings on Two Regulator Banks In 15 Minutes"



● Utility engineers have been utilizing the advantages of the *Vari-Amp* feature since 1940 on Allis-Chalmers single-phase power regulators. It takes just three simple steps to change the rating of an Allis-Chalmers single-phase power regulator. That's compared to the 10 complex operations required on other types of regulators. And you get five ratings in a single regulator instead of the two provided on other regulators.

Get the full story on the convenience, flexibility and reliability of Allis-Chalmers step regulators with the *Vari-Amp* feature. See your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-4804

ALLIS-CHALMERS

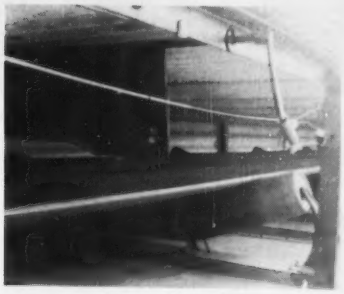
A-C ALLIS-CHALMERS

Crane Cuts Time

(*Continued from page* 102)

chines at convenient ground level locations. Piping for these gas facilities was carried to manifolds at six convenient boiler levels. This piping was left in place and now serves as permanent lines for compressed air and water service to boiler levels.

GENERATION—Maintenance



Hinged Paddle Stops Belt, Halts Chute Pluggage

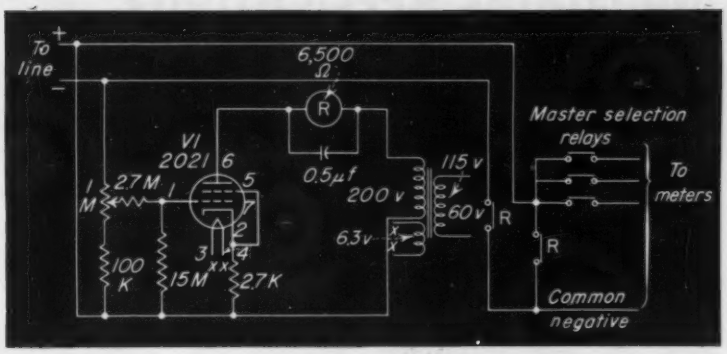
JOHN R. MARTIN, Muskingum River Station, Ohio Power Co, Beverly, Ohio

A hinged paddle connected to a conveyor trip cable has been installed over the coal belt at Muskingum River Station of Ohio Power Co. By stopping the drive motor at the proper time the paddle prevents large lumps of coal and foreign objects from plugging chutes in the transfer stations or from dropping onto and damaging the belt below.

The paddle was made from two pieces of ☆-in. sheet metal about the same width as the belt. The upper piece was welded to a horizontal shaft that passes through holes in the conveyor superstructure and attaches to a lever. The lower piece was cut to a radius that will clear normal belt loads and has slots for bolting to the hinged piece and adjusting the height of the paddle. Attached to the hinged paddle lever is a helical spring and the conveyor trip cable.

When an oversize object is on the belt and tilts the paddle, all belts back to the surge pile are stopped before any damage is done. This is achieved by placing the paddle far enough ahead of the transfer station so the belt will come to a complete stop.

SYSTEM ENGINEERING—Communication



TELEMETER PROTECTOR is designed to disconnect reading meters from line in the event the pilot voltage is reapplied due to faulty operation of equipment

Circuit Protects Telemeter Instruments

D. T. JONES, Communications Section, B. C. Electric Co, Vancouver, B. C.

Telemeter reading instruments may be protected against damage during reading periods by a simple electronic telemeter protector. This device is designed for use on certain types of supervisory control equipment in which the substation battery is used to monitor the cable pair between the substation and the control point.

In such installations, the pilot voltage from the battery is removed from the line, and the telemetering equipment is connected when a reading is desired. If the pilot voltage should not be removed or is reapplied after the meter is connected, due to a faulty operation, the sensitive 1-ma receiving meters will be damaged.

The protector disconnects the meter to protect it under all fault conditions that may arise on the telemeter circuit. Faults may be caused by improper adjustment or fatigue of pushbutton springs or by failure of audio signalling equipment or the substation decoding relay chain.

Equipment and connections for the protector are shown in the accompanying circuit diagram. Vacuum tube VI is a thyratron which is held at cut-off by the pilot voltage. When a receiving meter is selected and the pilot voltage is removed, VI conducts and closes relay R which connects the meter to the line. If the pilot voltage is reapplied before the reading is taken, VI will cut-off and drop relay R. This action disconnects the meter from the line and short circuits it to provide dynamic damping against overswing.

METERING—Operation

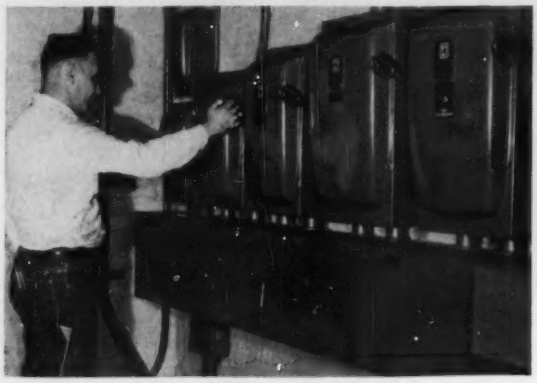
Dogs Bribed with Candy Don't Bite

Meter readers for the Richmond City Department of Utilities, Richmond, Va., have not suffered a dog-bite casualty in almost a year.

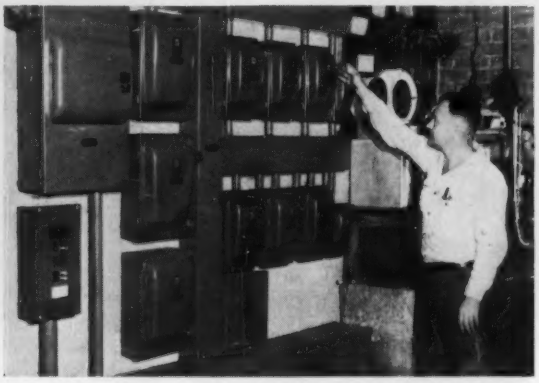
Dogs, according to W. W. Anders, safety coordinator for the department, were a major hazard to meter readers until about a year ago. Dog bites accounted for an average of one lost-time accident a month.

Seeking to avoid such incidents, officials of the department discovered one meter reader who had a 15-year record of no bites or other difficulties with dogs. He carried a box of dog candy or biscuits in his pocket which he used to make friends with viscious dogs on his route.

Since the department made such sweets standard equipment, not a single meter reader has been bitten. The department has gained also by avoiding the ill will and arguments that usually follow such accidents.



MODERN SERVICE ENTRANCE EQUIPMENT is installed in a special fireproof vault. From here, wires carry power to . . .



. . . LOAD DISTRIBUTION CENTERS, like this, which feed voltage to machinery to keep efficiency up and repairs down

Wiring Keynotes Laundry's Modernization

LEON ALBERTSON, Application Engineer, Philadelphia Electric Co, Philadelphia, Pa.

A complete new wiring system based on a two-phase primary was installed recently at the Holland Laundry, Inc., Philadelphia, to increase plant efficiency and to provide capacity for future electrical expansion.

The new installation eliminates two old dc generators—75 and 60 kw, respectively—which developed part of the power used at the laundry.

Two factors helped the laundry's management decide to tear out the old wiring with its 50-yr collection of modifications and henceforth to buy all power:

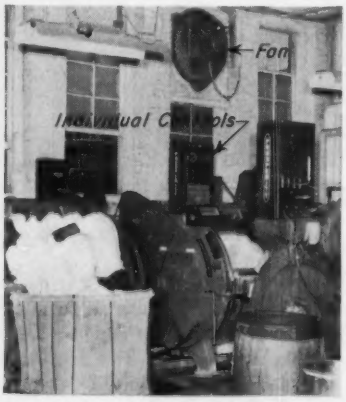
- First: Individual motor drives for each piece of laundry equipment were chosen. This up-dated the machinery to make each piece much more modern. Furthermore, many labor-saving devices were added to foster high-speed quality work.
- Second: Management decided the laundry business was complex enough in itself. It wanted to be relieved of problems created by the operation of a private power plant.

The distribution scheme selected for this plant is a combination of two systems: The primary service is 2,300-v, 2-phase, 3-wire. Three-phase service was not available. Two 100-kva transformers, 115/230-v, 2-phase, 5-wire, primarily carry the lighting load. Another two 100-kva transformers, Scott-connected on their secondary sides, provide 230-v, 3-phase power for laundry machinery.

These schemes were considered adequate to meet operating requirements. However, a 3-phase power system would have been preferred if it had been available.

Antiquated fuse panels, open-knife switches, and some circuits containing both ac and dc were removed and replaced by modern wiring. The changeover was done "hot" so that plant operations would not be interrupted. New equipment includes feeders to five load centers, modern panels with thermal-magnetic multi-breakers, and safety switches.

PHOTOELECTRIC EYES regulate movement of conveyor belt so that a ready-to-be-wrapped box always is awaiting the operator standing here at the tying machine



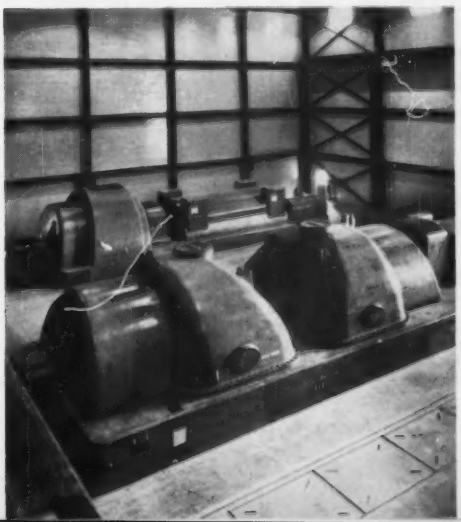
VENTILATING FANS are used to suck out heat and humidity in the plant

Robert Higgins, Howard Barr, John Dunnewind and H. I. "Hi" Lamphier (left to right) discuss lubrication of equipment at Clifty Creek plant. Howard Barr and Hi Lamphier are plant manager and assistant plant manager respectively. Standard Oil men Bob Higgins, industrial lubrication specialist and John Dunnewind, chief lubrication engineer provide lubrication technical service to customers. Together they have more than 38 years experience in such work—Bob 18 years, John 20. John has an engineering degree from the University of Michigan and is a graduate of Standard's Sales Engineering School. Customers of Bob Higgins and John Dunnewind find this kind of experience and training pay off *for them.*

Clifty Creek management selects NONPAREIL Turbine Oil—

—receives life-of-turbine guarantee for the oil

Approximately 60,000 gallons of NONPAREIL Turbine Oil were purchased for Clifty Creek, most of which are to be used to fill lubrication systems. Kilowatt capacity of installation will slightly exceed that of Hoover Dam.



Power and lots of it has been ordered for the AEC gaseous diffusion plant near Portsmouth, Ohio. Clifty Creek Plant in Indiana is the larger of two plants being built by Ohio Valley Electric Corporation to supply this demand. Six giant turbo-generators will be housed in the Clifty Creek plant. Combined capacity will be 1,290,000 kw.

NONPAREIL Turbine Oil will be the lubricant for Clifty Creek's six 215,000 kw. turbines. The oil is guaranteed, for the life of the turbines, not to exceed a neutralization number of 0.15 mg.KOH/gm.

Six other important benefits are obtained by the use of NONPAREIL Turbine Oil:

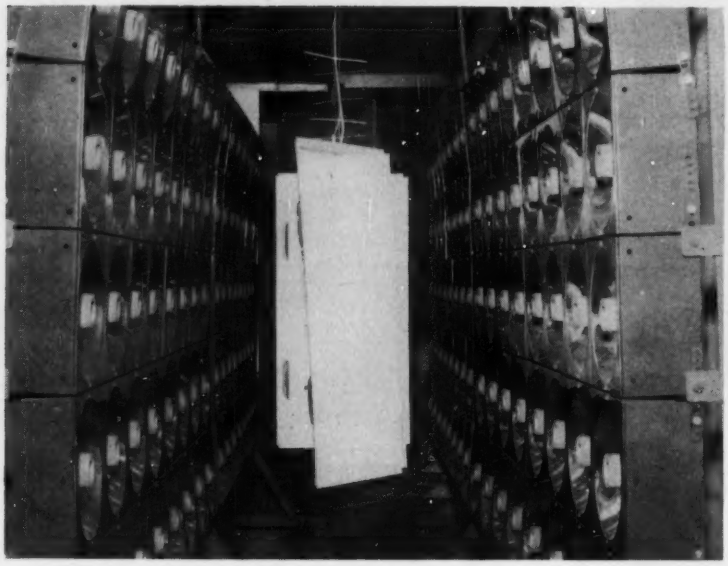
1. Correct viscosity to lubricate without excessive fluid friction.
2. Good demulsibility to permit removal of water which unavoidably gets into the oil.
3. High oil stability to insure resistance to oxidation and sludging.
4. Low pour point for fluidity at any operating temperature normally met.
5. Resistance to foaming, with special additive to counteract foaming tendency.
6. Capacity for protecting metal parts against corrosion.

Clifty Creek turbines join more than 800 other turbines now using NONPAREIL Turbine Oil, some for as long as 29 years. Inquire about NONPAREIL Turbine Oil of your Standard Oil industrial lubrication specialist in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

NONPAREIL Turbine Oil guarantee that will hang beside each of the six turbines at Clifty Creek.

STANDARD OIL COMPANY
(Indiana)

STANDARD



Infrared Drying Ends Storage Problem

Drying paint on sheet metal products has solved a storage problem for Melben Products Co, Cincinnati, Ohio. An overhead infrared oven, rated at 100 kw, 480-v three-phase, now bakes the paint while an adjustable-speed conveyor carries the metal sheets through. The dried products emerge ready for shipping. Each side of the oven consists of five rows of 16 ceramic-type 650-w infrared reflector units. Each row can be individually controlled. A percentage timer automatically pulses the power to govern the intensity and rate of heating. L. J. Langevin, Power Engineer, Cincinnati Gas & Electric Co.

Interlocked Cable Feeds Parchment Co

HARLEY McDANIEL, Electrical Consultant, Kalamazoo Vegetable Parchment Co, Parchment, Mich.

Interlocked cable has been performing highly satisfactorily at Kalamazoo Vegetable Parchment Co's plant at Parchment, Mich. After a test installation proved its value in 1947, the cable was installed on all 4,800-v circuits and on a number of 440-circuits.

During the past five years, the company put in a complete new electrical distribution system. It consisted of more than 20 group substations scattered throughout the plant. All were 4,800-v to 440-v, 3-phase, 60-cps. Interlocked cable chosen to serve these stations ranged from 2/0 to 500,000 cm. Some installations used three 3-conductor, 500,000 cm in parallel.

The cable was selected because it offered ease of installation and low cost. It has been used on outdoor-indoor circuits, and has withstood inclement weather well.

Why Melt Under Vacuum?

Why melt metals under vacuum? In describing a 1,000-lb induction unit used at General Electric's Carboloy dept, Detroit, the company cited these benefits: A purer metal; closer compositional control; sometimes the birth of whole new alloy families; improved workability, fatigue strength and mechanical properties; good salvage value for scrap. Vacuum melting is a growing field. Only 5 yr ago, 50-lb batch-type melts were rare. Now 1,000-lb melts are becoming common. Engineers already are talking about 10,000-lb melts and continuous use.

INDUSTRIAL BRIEFS

Motorizing two 25-hp planers and a 50-hp dust collector fan has helped Hinzmann and Waldmann, Inc, save $12,000 a year at a plant in Hughesville, Pa. A steam engine had been serving part of the load in the plant. Now the boiler pressure is reduced to about 6 psi, and steam is used only for dry kilns and building heat. The electric motors have worked well to date and other machines subsequently were converted to electricity. Kenneth H. Breon, Industrial Representative, Pennsylvania Power & Light Co, Williamsport, Pa.

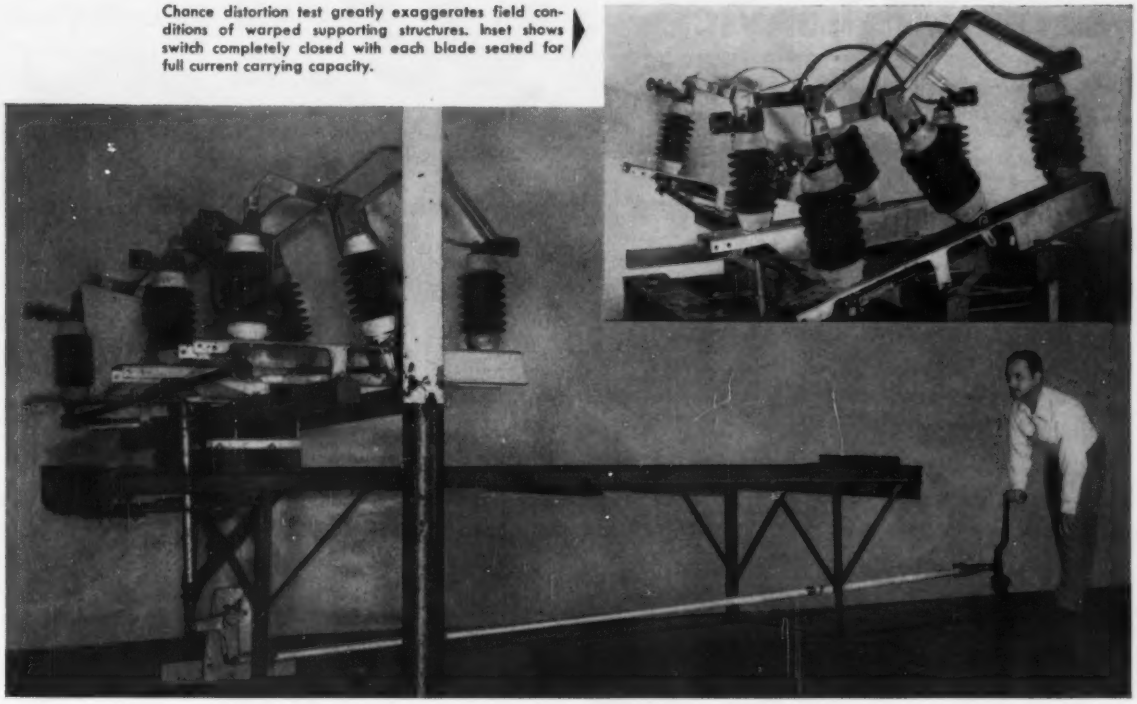
Glue is dried with a 15-kw resistance heater at the Woodcraft Co plant in Kansas City. Micarta is glued to plywood to form table tops for card tables, porch furniture and tavern tables. Plant capacity using air drying was 32 tops per day. The new machine with electric drying turns out one every 3 min. A. T. Gaulke, Power Sales Engineer, Kansas City Power & Light Co, Kansas City, Mo.

Preparing small bar stock for forging is done more quickly and economically than by a previous method used at Black & Decker Mfg. Co., Hampstead, Md. A 60-kw direct resistance heater with automatic hopper feed is used to heat bars up to ⅝ in. diameter and 10 in. in length for forging. Heating takes only 8 to 12 seconds. An electric eye which measures temperature causes the stock to be ejected at the proper time. Heating is so rapid that scaling is practically eliminated. This in turn improves die life. As a bonus benefit the working area is much cooler than it formerly was. George H. Hoffman, Industrial Power Dept., Baltimore Gas & Electric Co., Baltimore, Md.

SEND IN
YOUR INDUSTRIAL BRIEF

You'll get a great deal of satisfaction from knowing that your item may help someone else with a similar problem. And you'll get a $5 honorarium too for each item accepted. Send us the basic facts covering the application; the name and location of user; benefits, advantages, and load characteristics of the application. Mail to: Industrial Editor, Electrical World, 330 W. 42nd St., New York 36, N. Y.

Chance distortion test greatly exaggerates field conditions of warped supporting structures. Inset shows switch completely closed with each blade seated for full current carrying capacity.



Torture rack tests prove

CHANCE WN-VN Switches

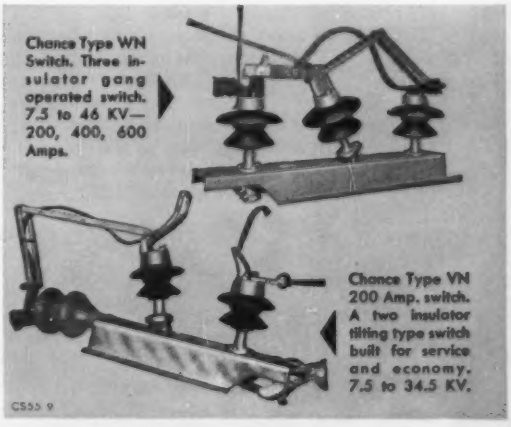
make positive contact under all conditions

Even the most violent warping of green crossarms under unequal line tension will never distort the phases of your gang-operated switches as greatly as the torture rack shown in the picture above. But even if they did—your CHANCE WN-VN SWITCHES would still open and close uniformly and easily. The reason? . . . The exclusive Chance Compensator Control that operates each phase independently of the others—that eliminates closing shock even when switch blades are slammed, and gives extra leverage for smooth, easy operation. Compensator control also keeps the operating force in line with the blade motion. WN-VN switches can't get out of line.

Chance WN-VN Switches are easy to install—time consuming "threading" of the interphase shaft is eliminated because the shaft is clamped into position —you can even mount these switches below the pole top without shifting them off balance.

There are other features you'll like, too . . . the extra wide tilting insulator mounting that eliminates side play . . . the deep-drawn flanged bases that won't cut into wood supports . . . and the ice breaking "crow bar action" that enables one man to easily open or close these switches even after the most severe ice storm.

But get the whole story. Ask your Chance Representative, or write for complete catalog information and test data.



Chance Type WN Switch. Three insulator gang operated switch. 7.5 to 46 KV—200, 400, 600 Amps.

Chance Type VN 200 Amp. switch. A two insulator tilting type switch built for service and economy. 7.5 to 34.5 KV.

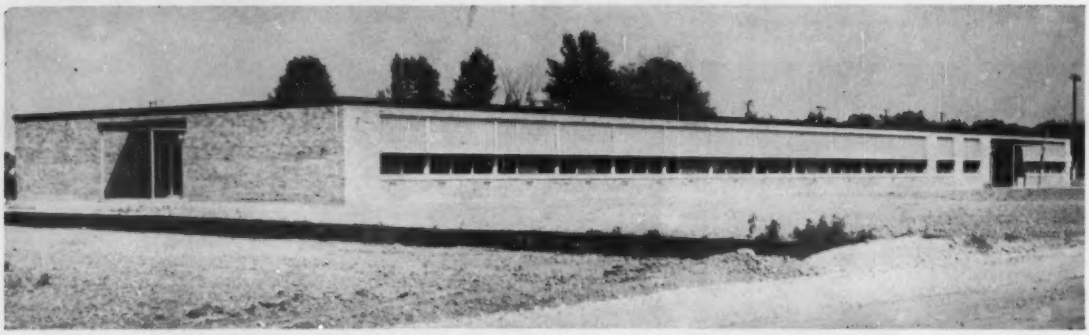
CS55 9

You know it's RIGHT when you specify CHANCE

A·B·CHANCE CO·

CENTRALIA, MISSOURI

SAN FRANCISCO, CALIFORNIA



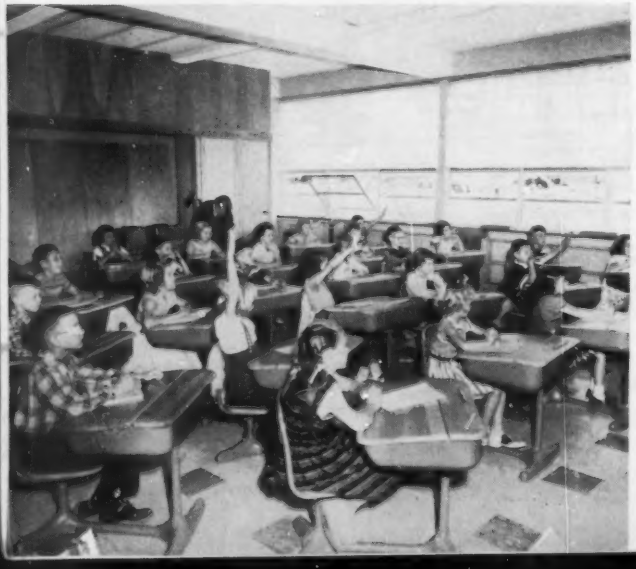
WITH HEATING, OTHER ELECTRIC FEATURES, THIS HARTFORD CITY SCHOOL WILL HAVE 460-KW CONNECTED LOAD

Here's why . . .

New Indiana School Heats Electrically

FOUR ELECTRIC HEATING UNITS, beneath windows, serve each classroom. Each has 4 kw, 208-v, single-phase rating

DESK TOPS GET 50 FT-C of lighting by use of nine 2-unit slimline fixtures in each room. Note heaters by windows



- **It gets best quality heating at minimum cost**
- **It saved $60,000 on construction costs**
- **It eliminated need for one janitor**

When Hartford City, Ind., school officials decided that a new school would be required to serve the community's growing population, J. E. Hughes, Indiana & Michigan Electric Co's local representative, quickly moved in with a pitch for electric heating.

Throughout the planning of the new Parkside Grade School, Hughes worked closely with architect and school authorities, supplying them with all needed installatior and operating data. By the time the hour of decision arrived, school officials were convinced it would provide the highest quality heating at the lowest possible cost. They considered these factors:

1. Electric heating would eliminate the need for a stack, pipe trenches, and a boiler room with its specially constructed sunken floor.
2. It would cut maintenance and redecorating costs.
3. Services of one less janitor would be needed.

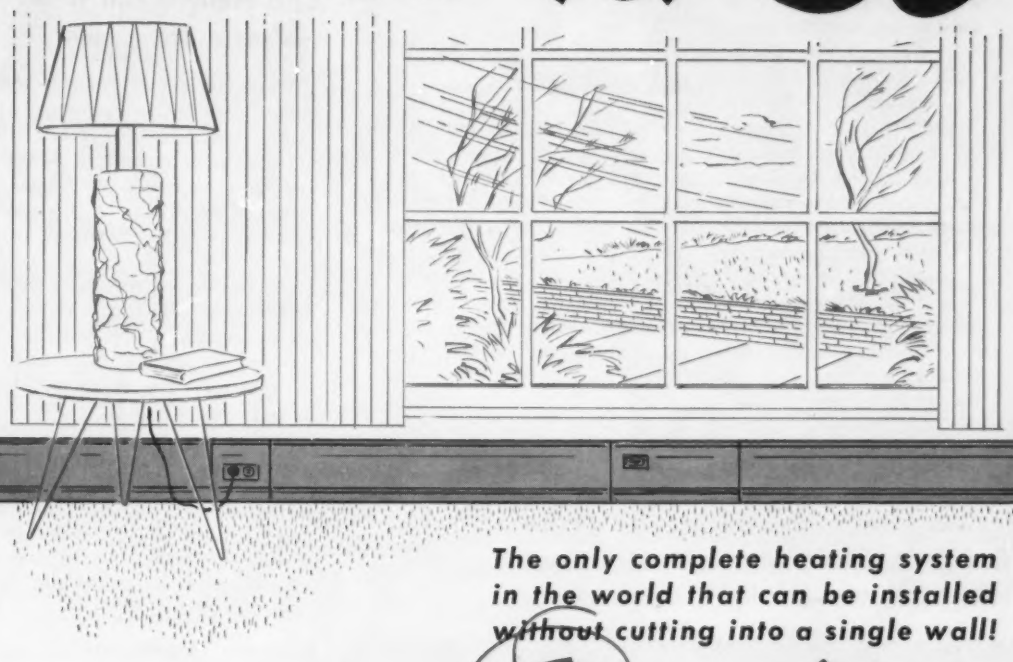
As electric heating jobs go, Parkside School is a big one. First wing was opened for classwork last fall. A second wing will be ready for the 1956-57 school year. When fully completed it will house 12 classrooms, each 28 x 35½ ft; a kindergarten room; a 65 x 53 ft multipurpose room; library; kitchen; three offices; two rest rooms; a health room; and two storage rooms.

Each classroom is heated by four 4-kw, thermostatically controlled resistance heating units. Ventilation also is automatically controlled. An exhaust fan discharges air through two plenums over the corridor. Blowers bring in fresh air. The exhaust system is controlled by a clock which turns it on automatically at the beginning of the school day and off at the close.

With electricity furnishing the heat, other up-to-date electrical applications naturally followed. Classroom lighting puts 50 ft-c on desk tops, provided by two slimline

(*Continued on page* 114)

NEW for '56



The only complete heating system in the world that can be installed without cutting into a single wall!

NEW! ADVANCED Cavalier® AUTOMATIC ELECTRIC BASEBOARD HEAT

NEW! **. . . BUILT-IN THERMOSTATIC CONTROL SECTION.** A dramatic new Cavalier development *that simplifies electrical work!* Saves wiring and installation costs because it fits right into the baseboard lineup. 12" long and same height as baseboard. Accurately and automatically controls temperature for each room. Like magic, a small heater within the control section keeps air moving across liquid-filled, sensitive thermostat bulb. Assures quick response to temperature changes. A *real feature* you can profitably promote.

Cavalier also offers two wall-mounted thermostats (White-Rodgers, Minneapolis-Honeywell) to satisfy the preference of any home-owner.

NEW! **CONVENIENCE OUTLETS** Built right into the heating system. Now, all the outlets your customers want! Each outlet section includes a standard 110 Volt double outlet. Placed between baseboard heater sections, they'll fill a need every home-owner recognizes. Sections 4¼" wide fit snugly with baseboard heaters. No cutting into walls or fishing around for wires. *A Cavalier first* with a real sales potential.

Now, America's luxury heat offers even more features! This new, super-efficient electric baseboard is *first* with convenience outlets and *newest designed* built-in automatic thermostat! And it is the *only* baseboard with a surface temperature that stays below 125° F. For gentle, balanced heat, Cavalier Baseboard is the most efficient ever developed.

Whether it's a new home or old, one room or many, Cavalier Baseboard is right for those who want truly modern heating. Easily installed—simply replaces part of the usual baseboard trim. Put it under low windows, apply it to "tough" jobs with less work for you. No cutting into walls. Wire for heater sections, thermostatic control and outlets at one time!

Triple your contract with no added overhead. Add Cavalier electric heat to your sales and *get a bigger share of the builder's dollar.* And make more money with the business-like mark-up on Cavalier equipment.

Sell Cavalier electric heat—a profitable new business for the electrical contractor!

SEE YOUR DISTRIBUTOR OR WRITE: ELECTRIC HEATING DIVISION, CAVALIER CORPORATION, CHATTANOOGA 2, TENNESSEE

NEWEST BATHROOM AND KITCHEN HEATERS! Solid, stainless-steel exterior, solid aluminum reflectors. No plated parts to rust by humidity. *Cool-edge design* for use with plastic tile. Two accurate automatic, one non-automatic, models. All budget priced.

NEW BEAUTY, IMPROVED DESIGN for wall insert, Surface Mounted and Portable Heaters. Copper-clad, curved reflectors roll heat gently into rooms. Color blended coils and cones. Efficient floor furnaces too, and only 13¼" deep for easy cleaning. All automatic.

School Heats Electrically

(*Continued from page* 112)

fixtures, nine units per room. The kitchen, when opened with the second wing, will be equipped with all-electric cooking and baking facilities plus a walk-in cooler and a freezer unit. Other features:

- Electric heating cable embedded in 400 sq ft of floor in the kindergarten room. Cable is thermostatically controlled and is turned on when the youngsters lie down on the floor for their rest periods.
- An electric incinerator to handle waste paper and other refuse. Cost was found to compare favorably with equipment using other fuels.
- Electric water heaters to supply kitchen and wash rooms.
- Electric hand dryers in the rest rooms.

Officials estimate savings in construction costs to run at about $60,000. They credit the savings to electric heating and other construction economies. Job's total connected load will be 460 kw, transformer size 300 kva.

New Fluorescent Items

- Sylvania Electric Products, Inc, has introduced two new starters, one for hard-to-start conditions which is said to automatically reset itself after cutting a defective lamp out of the circuit. It is designed for use on 20-w lamps. The other is intended for preheat installations where high voltage conditions instantly start the lead lamp, thereby reducing its life. The new starter, for use with 40-w lamps is claimed to provide a long preheat time conducive to normal lamp life.
- A new line of fluorescent transformers for use with outdoor plastic signs is offered by Jefferson Electric Co, Bellwood, Ill.

Bright Lights Pull Night-time Shoppers

High illumination levels in both the parking lot and self-service stores are regarded as vital "salesmen" at this Sacramento Calif., shopping center. Nine 1,000-w color-corrected mercury-vapor lamps spread an average 1.5 ft-c of light over the 165,850 sq-ft lot. Two fixtures each on three poles light the lot's center portion while three fixtures on separate poles light the periphery. General illumination inside the food market hits about 75 ft-c and in the drug store it reaches 100 ft-c.—William J. Flynn, Lighting Representative, Sacramento Municipal Utility District, Sacramento, Calif.

Heat Pumps Save

. . . $3,000 in initial cost and $200 yearly in cost to run for Indiana landing agency

While resistance heating shaves costs for an Indiana school (p 112), two electric heat pumps are bringing savings of more than $3,000 in installation costs and $200 a year in operating expenses in a newly renovated Marion, Ind. financial institution.

The five-ton capacity units, built by Westinghouse Electric Corp, are installed on the second floor of the 4,400-sq ft building and change its 39,460 cu ft of air more than seven times an hour.

Cost of operation is estimated at $700 a year, compared to $900 for the building's former system which provided only heat. Complete installation cost was $10,000, compared to an estimated $13,000 it would have cost for comparable equipment using other fuel sources.

Separate Thermostats

Temperature control is gained by equipping the machines with separate thermostats and using each to serve a floor.

"Not only are we saving money," said George E. Hayes, president of First Federal Savings & Loan Association, the building's occupant, "but we believe we are providing a cleaner and more healthful atmosphere for our customers and employees.

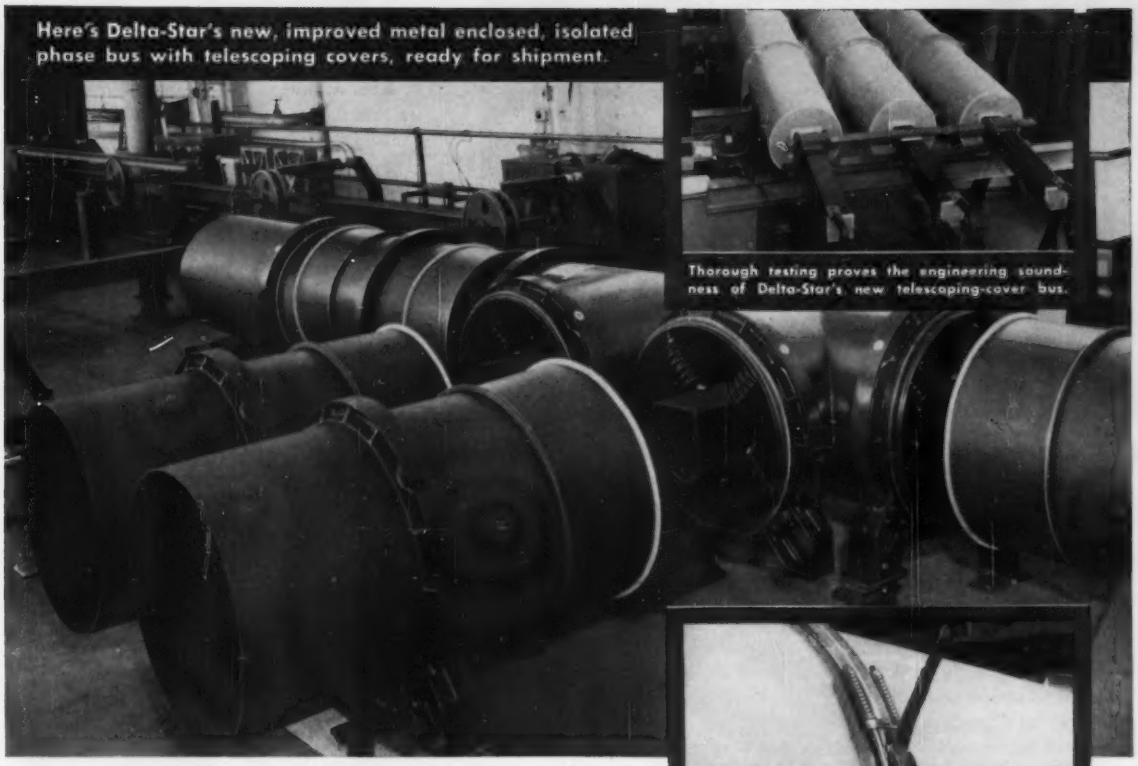
"Since the heat pumps use only electricity and air, we have experienced a noticeable absence of dirt. We anticipate less need for interior remodeling as a result."

Space Savers

Mr Hayes also mentioned the heat pumps' space saving features and their ability to maintain uniform temperatures.

Charles H. Marks, Marion's district commercial and industrial sales supervisor for Indiana & Michigan Electric Co, named some other advantages: Elimination of the need for water in their operation, less maintenance costs and a provision for up to 20% fresh air in the building during each cycle.

Paul Greiner, Indiana & Michigan air conditioning specialist, supervised designing and engineering of the installation.



Here's Delta-Star's new, improved metal enclosed, isolated phase bus with telescoping covers, ready for shipment.

Thorough testing proves the engineering soundness of Delta-Star's new telescoping-cover bus.

Lower costs—install new DELTA-STAR isolated phase bus with Telescoping Covers

Simplified installation and time and money-saving maintenance readily explain the popularity of Delta-Star's new metal enclosed, isolated phase bus.

Installation is simplified by eliminating bolted covers. Longitudinal sections 6 to 8 ft. long are pre-assembled and shipped in lengths as large as your facilities can handle. Telescoping covers are clamped into position and locked with two screws. There are no longitudinal gaskets to install.

Inspection and maintenance is quick and easy. Simply unlock the telescoping covers and slide them back. Spring loaded clamping assures air-tight seal against elements, moisture and dust.

There's no question about cutting installation and maintenance costs when you install the new Delta-Star telescoping-cover isolated phase bus. Investigate soon.

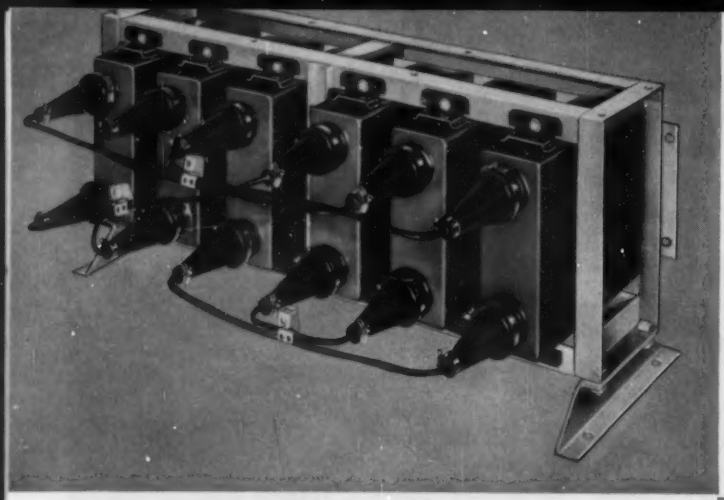
Closeup of telescoping-cover clamping ring with toggle opened. Cover slides back, exposing 2½ ft. bus area. Saves time and money on inspection and maintenance.

Clamping rings securely locked and bolted in position. Spring pressure and circular gaskets maintain tight seal. Use of circular gaskets reduces gasketing by 50%.

For the best in high voltage electrical equipment—specify DELTA-STAR

DELTA-STAR ELECTRIC DIVISION

H. K. PORTER COMPANY, INC.
OF PITTSBURGH
2437 Fulton Street • Chicago 12, Illinois
District Offices in Principal Cities



Distribution Cutout

This open-type distribution cutout is said to interrupt fault currents up to 10,000 amp rms. The Type 33-F cutout is available for 100 and 200-amp current ratings and line voltages of 5, 7.5, 15 and 25 kv.

The pole or cross-arm mounted cutout is operated with a hookstick and uses universal EEI-NEMA Type K or T fuse links. The 33-F is designed for controlled rate of ejection of fuse link.

Southern States Equipment Corp, Hampton, Ga.

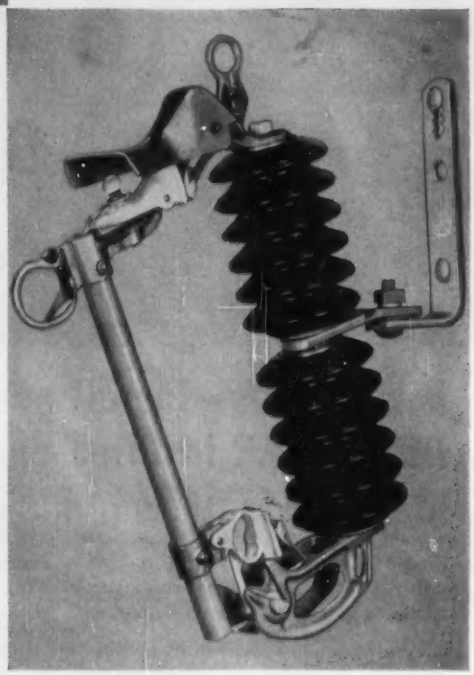
Submersible Capacitors

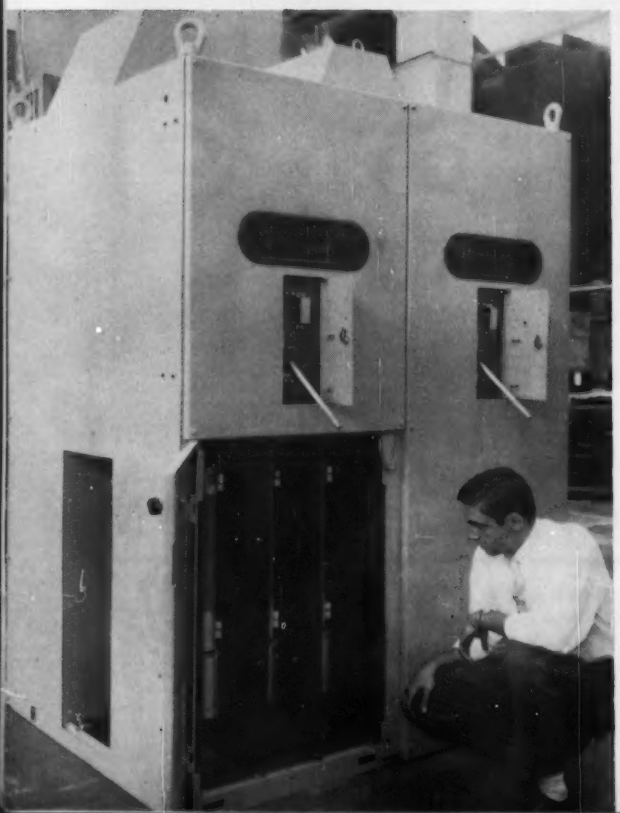
Designed for secondary network applications, submersible capacitor equipments are available in 40, 80 or 120-kvar banks, rated 216 v, three phase.

The equipments are mounted in supporting structure for installation in underground network vaults. They can be passed through a 30-in. manhole, can be stacked a maximum of three tiers high, and can be floor, wall, or ceiling mounted. Ambient temperature limits are 55C for single tiers and 40C for two or three tiers.

Each equipment consists of a group of single-phase capacitor units rated 13.3 kvar, 216 v, with one terminal-mounted current-limiting fuse. Terminals are enclosed in Neoprene covers made watertight by clamps at both ends.

Line Material Co, Milwaukee 1, Wis.





Load-Break Switch

An air-insulated load-break switch is intended for use on 15-kv circuits with basic insulation level of 95 kv. It has a rating of 500 operations interrupting 100 amp at 15 kv and a 600-amp continuous current rating. The switch meets NEMA standard of 40,000 amp momentary and 25,000 amp for four sec.

The 34 x 48 x 90-in. case matches appearance and heights of standard switchgear and dry-type power-center transformer cases. Provision is made for connections either at the top or through the bottom of the case.

Westinghouse Electric Corp, 401 Liberty Ave, Box 2278, Pittsburgh 30, Pa.

(*More New Equipment on page* 118)

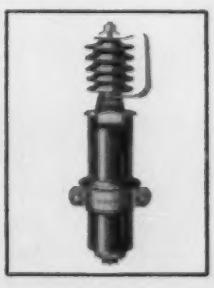
BUMBLE BEES CAN'T FLY

Physicists and Aerodynamic Engineers have been mystified for years by the flight characteristics of the common bumble-bee. According to their calculations, the bee should never be able to leave the ground. His mass, his wing-spread and his muscular development all added together in a mathematical manner positively prove that he can't take off. Nevertheless, there he is, in the air, buzzing merrily about with a heavy pay-load of honey.

So it is evident that some mathematicians must be wrong. They are like the man who stood looking at the giraffe while saying, "There is no such animal." The same is true of some manufacturers, especially in the lightning arrester field. You have doubtless heard much theory, sincerely propounded, some mathematics and considerable test data, all designed to prove that expulsion type lightning arresters are impractical, won't work and are unsafe. *Some* expulsion designs have failed. *Many* valve types have failed.

Some designers are smarter, or luckier, or better mathematicians than others and their products succeed where others do not. Call it what you will, over a million Autogaps are on the lines, out-performing, out-testing and out-protecting every other design in existence, and have been doing so for 15 years. Autogaps are the only arresters carrying a 5-year warranty.

Can we believe what we can see or must we still say that, "Bumble Bees Can't Fly!"



HUBBARD AND COMPANY

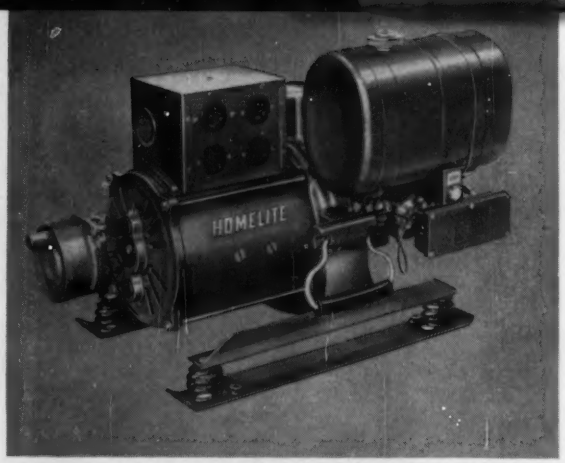
Pittsburgh 1, Pa.
Chicago 50, Ill.
Oakland 8, Cal.

Portable Generator

Stand-by power in emergencies can be provided by this 1.5-kw portable generator (No. 35A113).

The 90-lb, 115-v, 60-cps, ac unit features close voltage regulation, the manufacturer says. The dc winding and appurtenances are eliminated, and a Germanium bridge rectifier is used for excitation. Voltage change from no load to full load is 4%. When no current is drawn, an idle control, which consists of rectifier, relay and solenoid, automatically switches to idle speed.

Homelite, Port Chester, N. Y.

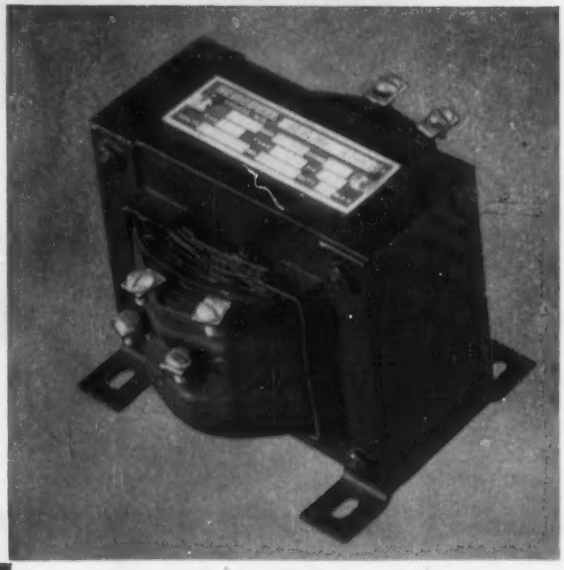


Saturable Reactor

This saturable reactor has been developed for applications where the degree of linearity and harmonic distortion of load current is important. It can be designed to provide almost any load current waveform, manufacturer says.

Some advantages claimed for the unit are: Response is very fast; dc power requirement is a minimum; multi-unit reactor can be built for single and polyphase systems; and power efficiency is equivalent to that of transformers.

Hevi-Duty Electric Co, Milwaukee 1, Wis.



30-Channel Oscillograph

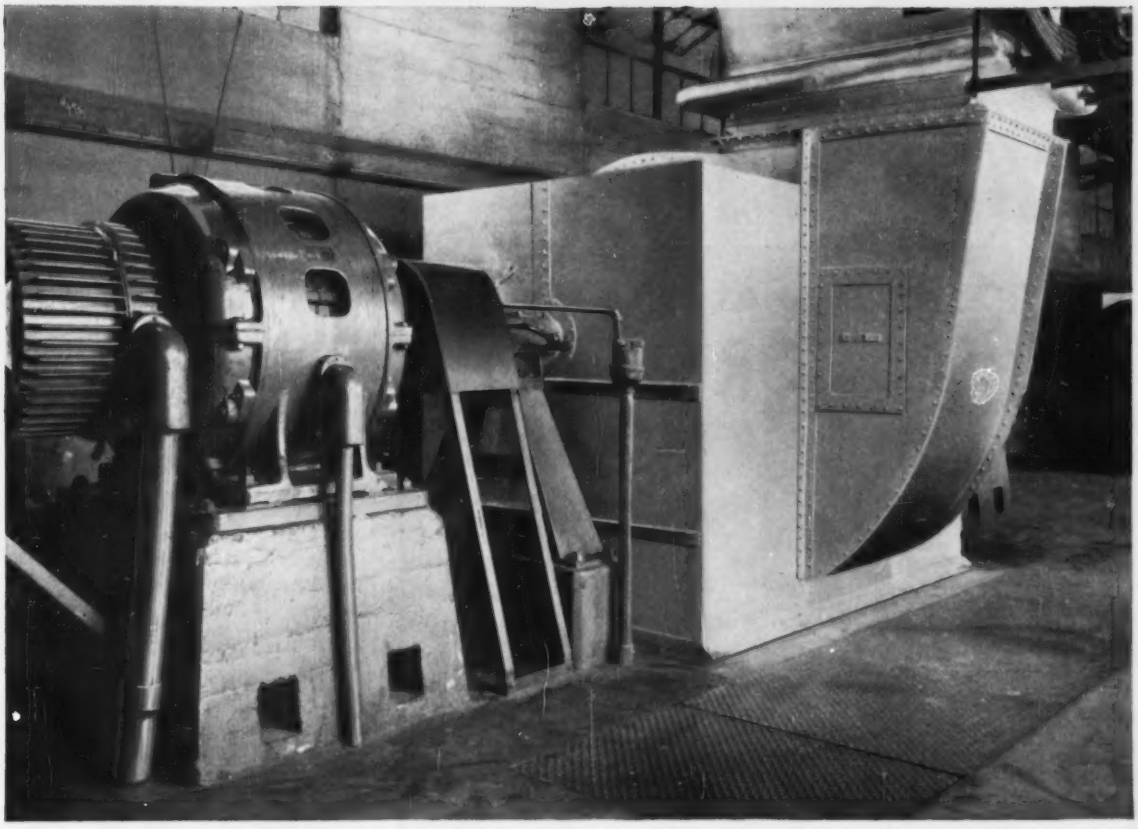
When a fault occurs, this 30-channel oscillograph starts to record automatically and reaches full recording speed in two millisec.

Starting relays initiate the RS9-30 oscillograph from any fault conditions. The relays select chart speeds of either 12 or 3 in. per sec.

Three reserve lamps can automatically replace each of the two galvanometer lamps. Two calibrating screens are provided, one on the front control panel and a focal-plane screen which automatically drops into place when a take-up cartridge is removed. Write for Bulletin 2-F-2-NR.

Hathaway Instrument Co, 1315 S. Clarkson St, Denver 10, Colo.

(*More New Equipment on page* 120)



"Buffalo" Induced Draft Fan Installed in 1925

WHERE LONG-WINDEDNESS is a virtue!

The place where long-windedness is a prime virtue is in your boiler draft equipment. While the everlasting draft fan is yet to be invented, it is certainly true that the *longer* a fan can stand up under the beating of draft service, the more money you're saving.

That's why we've always concentrated on building long life into "Buffalo" Fans. Consider these "Q" Factor* features that explain the number of 30-year "Buffalo" Fans still on the job:

- Heavy steel plate blade and housing construction to stand heat and erosion.
- Low rotor scrubbing velocities, due to efficient modified backward curved blades.
- Strong rotor with stiff center plate — massive hub.
- Oversize alloy steel shafts with integral thrust collars.
- Low bearing pressure and large oil reservoir.
- Quick-opening access doors and removable bolted, sectional housing.
- Stable performance under widely varying load conditions.

The "Buffalo" Draft Fan you buy today embodies the finest and latest features for long life, performance and economical maintenance developed in our 78 years. It will pay you to write for Bulletin 3750 today and get all the facts.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo"

BUFFALO FORGE COMPANY

212 MORTIMER ST. BUFFALO, N. Y.

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

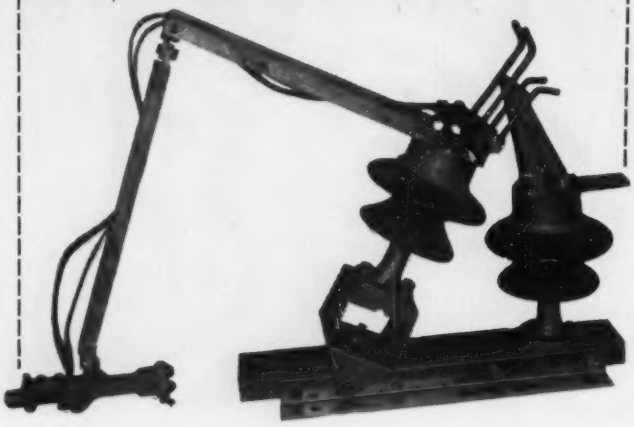
Sales Representatives in all Principal Cities

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

GOOD ENGINEERING PLUS EXTRA SERVICE FEATURES

IN THE

ROYAL Type AL-2 TILTING INSULATOR SWITCH



FOR substation or pole-top mounting, Royal's Type AL-2 Tilting Insulator Switch is husky and economical. Like all other Royal group-operated switches, the AL-2 has high-pressure beryllium contact rods which are individually self-adjusting. This feature compensates for any mis-alignment of the interphase shaft which may occur. In both open and closed positions, positive stops against the switch base are provided by the insulator adaptor.

The pantograph assembly can be adjusted to swing for any angle up to 45°, thus saving an extra pole sometimes needed when the conductor comes in at an angle. Another popular money-saving feature is the new dead-end clamp supplied as an integral part of the switch. This saves installation time and has quadrupled the holding power of the strain assembly.

The AL-2 switch is available from 7.5 to 46 kv in current ratings from 200 to 1200 amp.

Royal

A Part of the Arsenal of AMERICAN POWER PRODUCTION

ROYAL ELECTRIC MANUFACTURING COMPANY
INCORPORATED
1122 EAST 87th STREET Chicago 19, Ill.

Saturable Reactor Controls

An electronic control system automatically regulates operation of saturable core reactors used with resistance, high-frequency or induction furnaces. The system provides proportional control with automatic reset. It is designed for applications where current interruption for control purposes is undesirable.

The system comprises an electronic controller with a unit known as an Electr-O-Volt controller. These instruments measure temperature and any deviation from the desired control point and send a dc signal to a power amplifier, which in turn causes the reactor to vary the power fed to the furnace.

For technical details, request Bulletin E-118-51.

Minneapolis Honeywell Regulator Co, Wayne & Windrim Aves, Philadelphia 44, Pa.

Plugging System

A counter-emf plugging system is designed for protection of dc motors used on reversing mill drives, crane drives, and similar applications.

Field adjustments of either the accelerating or plugging circuit resistances will not alter the system's accurate response. Operation of the system is completely independent of variations in line voltage.

The counter-emf plugging system uses a small rectifier and mill-duty relay that require no field adjustment. The relay permits full plugging protection at any motor speed down to about 10% of maximum rated speed.

Electric Controller & Mfg Co, 4500 Lee Rd, Cleveland, Ohio.

Radiation Monitor

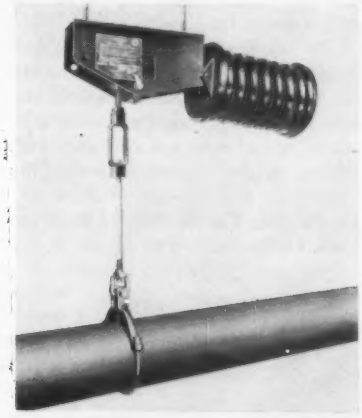
A walk-in trailer-mounted air monitor system is designed for measuring and recording airborne radioactivity. The manufacturer recommends the system (Model AM-5) for use by utilities, industrial plants, and research and laboratory groups working with radioactive materials.

The AM-5 operates automatically and unattended for periods up to seven to ten days. It provides a permanent continuous record of radioactivity in

the area, plus complete recorded weather data if desired.

The system consists of two air monitor units, one with continuously moving filter paper and the other with fixed filter paper. Also included are an all-weather air conditioner, anemometer, auxiliary motor-generator, storage locker, and work area. Catalog N-8 furnishes additional information.

Nuclear Measurements Corp, 2460 N. Arlington Ave, Indianapolis 18, Ind.



Constant Support Hangers

An extended line of constant support hangers (Model R), with load capacities from 31 to 32,267 lb, is said to permit expansion and contraction of piping systems without developing dangerous stresses.

The hanger's field adjusting bolts have been relocated for easy load readjustment. The bearings have been relocated in the frame to allow the main pivot to rotate and carry the load indicating pointer. To simplify the erection of new piping, stops are provided to lock the hanger in a fixed position. These stops are also used during hydrostatic test.

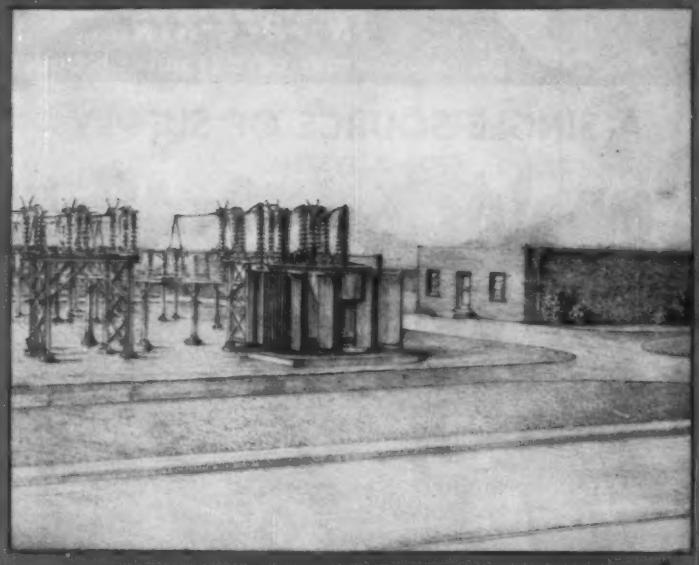
Grinnell Co, Inc, 260 W. Exchange St, Providence, R. I.

Portable Psychrometer

Relative humidity measurements are said to be obtained in 20 to 30 sec by a motorized, battery-operated portable psychrometer. The unit is designed for use in air conditioning research, commercial manufacturing, cold storage systems, and other industrial processes.

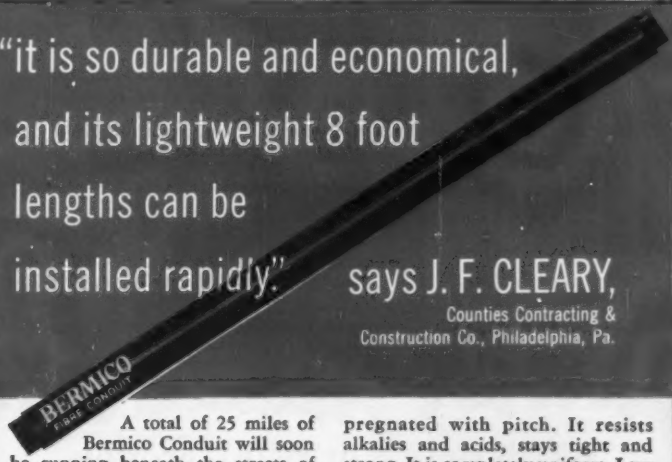
(*Continued on page* 122)

BERMICO® electrical conduit to carry 13,000 volt cables because . . .



"it is so durable and economical, and its lightweight 8 foot lengths can be installed rapidly."

says J. F. CLEARY,
Counties Contracting & Construction Co., Philadelphia, Pa.



A total of 25 miles of Bermico Conduit will soon be running beneath the streets of Baltimore, between Baltimore Gas & Electric's Center and Woodbrook Substations. Of fifteen lines connecting the points, three will be used at once, the others as power needs grow.

Precisely engineered Bermico Conduit is made of wood cellulose impregnated with pitch. It resists alkalies and acids, stays tight and strong. It is completely uniform. Low in cost, it installs quickly and easily.

No wonder so many leading electrical contractors specify Bermico, for every type of soil from coast to coast.

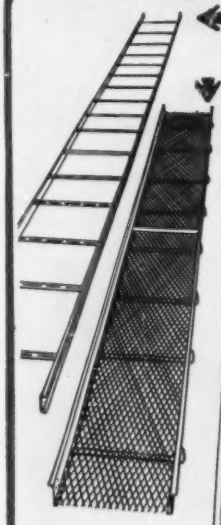
Immediate shipment of all sizes and fittings is guaranteed.

Distributed by WESTINGHOUSE Electric Supply Company
Offices in principal cities

BROWN COMPANY
Berlin, New Hampshire
GENERAL SALES OFFICE: 150 CAUSEWAY STREET, BOSTON 14, MASS.
SOLKA PULPS • SOLKA-FLOC • NIBROC PAPERS • NIBROC TOWELS • NIBROC KOWTOWELS
NIBROC TOILET TISSUE • BERMICO SEWER PIPE AND CONDUIT • ONCO DESOLES • CHEMICALS

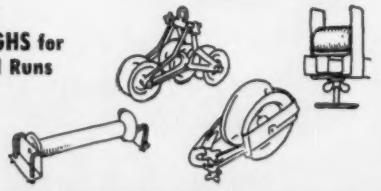
ALUMINUM
OR GALVANIZED STEEL
SUPPORT SYSTEMS
FOR POWER AND CONTROL CABLES
IN-FREE-AIR
DESIGNED AND DEVELOPED BY HUSKY PRODUCTS

A SINGLE SOURCE OF SUPPLY
FOR A SYSTEM
Complete to the Last Bolt



CABLE RACKS for Power Circuits
CABLE BASKETS for Control Circuits
CABLE TROUGHS for Limited Runs

LONG SPAN SUPPORTS for Bridging Applications



INSTALLATION TOOLS for fast cable "pulls"

PLUS over 1,000 items of accessory hardware including:

hanger clips	suspension fittings
hanger rods	wall brackets
support channels	cable clamps
pipe spacers	cable banding
concrete inserts	insulator blocks

Lowest Ultimate Installed Cost

THRU SAVINGS IN FIELD ERECTION

- LIGHTWEIGHT ALUMINUM—faster installation
- LONG SPANS—fewer supports
- LONG LENGTHS—fewer splices
- HEAVY LOAD CAPACITY—fewer runs

★

Design and layout assistance available
Unit responsibility assumed
Over 2,000 completed installations—Send for catalog.

AVAILABLE THROUGH LEADING CABLE MANUFACTURERS

HUSKY PRODUCTS, INC.
5300 VINE STREET, CINCINNATI 17, OHIO

New Equipment

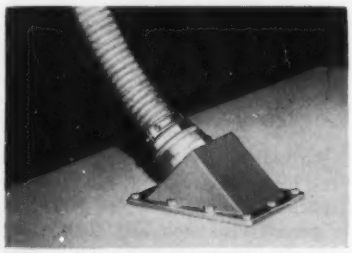
(*Continued from page* 121)

The instrument consists of a housing with an air intake tube connected to a duct system with exhaust slots. It has a 4.5-v motor with nylon fan blade powered by three standard flashlight batteries.

Other components are a pair of matched calibrated thermometers, water reservoir and wick connected to the wet bulb thermometer, and an on-off switch. The thermometers are shock mounted with spring clips and rubber grommets for field use.

The psychrometer weighs 1.5 lb and measures 7.5 x 3.25 x 1.5 in. Standard range is 20 to 120F, accurate to within one deg at all points. Centigrade and special range units are available. For further details, request Bulletin No. 16W9.

G. M. Mfg Co, 50 W. 3rd St, New York 12, N. Y.



45-Degree Adapter

Armored cable can be brought into switchgear or other housings at a 45-deg angle with a new adapter that is reported to simplify installation and reduce space requirements.

The adapter is recommended for terminations where space is insufficient to permit bends in large cable. The device is designed for use with standard sizes of cable terminators and 2 to 3.5-in. armored cable.

PLM Products, Inc, 3871 W. 150th St, Cleveland, Ohio.

Ultra-Thin Glass Paper

Impregnations or binders can be added to microglass fibers, known as Tissuglas paper, to achieve desired electrical, chemical and thermal properties.

The properties obtained are, to a

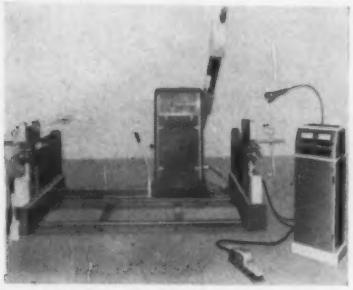
great degree, determined by the basic glass fibers in combination with a particular impregnation. The manufacturer states that impregnations used successfully include silicone, polyvinylchloride, melamine, epoxy, polytetrafluoroethylene and polyester preparations.

Potential applications include insulation for busbars, coil insulation, backing material for mica, and surfacing sheets for high and low-pressure laminates.

The ultra-soft, tissue-like film is available in thicknesses ranging from 0.5 to 13 mils and in widths up to 40 in. When specified, the binder utilized is insoluble in aqueous and most organic solvents.

The plain Tissuglas paper can be as much as 95% air by volume. This provides a carrier sheet composed of up to about 95% resin and the balance inert carrier. Wet strength is about 70% of dry tensile strength which ranges from 95 to 880 psi. Breaking strength varies from 200 to 1,350 grams per inch of width.

American Machine & Foundry Co, 261 Madison Ave, N. Y. 16, N. Y.



Industrial Balancer

An electronic industrial balancer is said to balance rotors from 1 to 5,000 lb dynamically and kinetically.

The manufacturer states that Model 708 has diametral range from 1 to 68 in. on any rotating piece, 0.04 in.-oz kinetic sensitivity, and 0.25 sq in.-oz dynamic sensitivity.

Other features include: Choice of flat belt friction or direct drive; remote handle-controlled starting, braking and speed adjustment; walking and locking mechanism for speedy length adjustment; and about 2-min set-up time without supervision.

Merrill Engineering Laboratories, 1240 Lincoln St, Denver 3, Colo.

(*More New Products on page* 125)

At home in the "range", Continental's permanently insulated heat resistant wire is the answer in this and many other similar products where extremely high temperatures require the best in protected wire.

For the usual and unusual wiring problem—Continental offers the widest range of sizes and types in stock, as well as facilities to manufacture wire for your own particular products' wiring requirements.

Where heat, oil, grease, corrosive vapors or moisture make wiring a question—Continental makes the wire to answer it.

ADDRESS: Continental Sales, Box 363, Dept. CWS-2
Wallingford, Conn. Phone COlony 9-7718.

SWITCHBOARD and RHEOSTAT WIRE—TYPE AIA
600 VOLT SERVICE
Available Sizes: 18 to 4/0 AWG inclusive

Solid copper conductor, asbestos insulation, asbestos braid . . . heat, flame and moisture resistant. U.L. Approved. Ideal for wiring rheostats, switchboards, control panels, and ovens where oil, grease, corrosive vapors, moisture **and high temperatures** are present. Maximum operating temperature 257°F.

Continental
WIRE CORPORATION
WALLINGFORD, CONNECTICUT • YORK, PENNSYLVANIA

"What, a TV camera looking into the boiler?"

"That's right, Paul. Television cameras are constantly observing the flame conditions in the furnace and the water level in the drum of the power plant boiler."

"Where does the 'picture' come out?"

"At two television receivers on the boiler control panel located in the central control room."

"Where was this again?"

"Down at Southwestern. Southwestern Public Service Company at Denver City, Texas."

"How big is the unit?"

"52,500. They showed me all around: through the 115 KV substation, the power plan building housing the turbo generator and outdoor boiler installation. Real neat job."

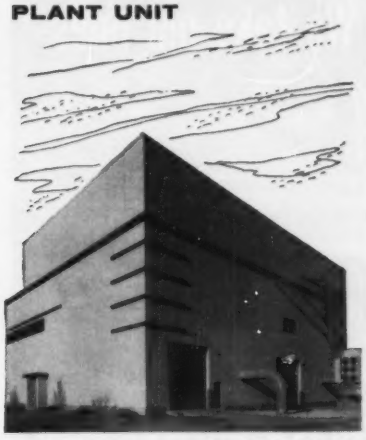
"Who built the plant?"

"A good outfit—Pritchard!"

J. F. PRITCHARD & CO.
4625 Roanoke Parkway, Kansas City 12, Mo.

"What, a TV camera looking into the boiler?"

TEAMWORK BUILT THIS SOUTHWESTERN PLANT UNIT



Teamwork between Pritchard and Southwestern staffs built their new Denver City, Texas power plant unit. Pritchard's ability to work closely with client personnel was the key to successful completion of this power plant project.

Pritchard can do the same job for you!

Why don't you contact Pritchard *first* . . . the next time you make plans to construct, modernize, or expand your power plant.

LIKE TO SEE THE PICTURES?

We'll be glad to send you photographs of this plant unit. They will give you a quick, illustrated tour through the Southwestern installation. Just send your name and address on your company letterhead and we'll send them to you!

INDUSTRY'S PARTNER FOR PROGRESS

J.F. Pritchard & Co.

ENGINEERS • CONSTRUCTORS

Dept 511, 4825 Roanoke Parkway
Kansas City 12, Mo.

SERVING THE GAS, POWER, PETROLEUM AND CHEMICAL INDUSTRIES

BOSTON, CHICAGO, BUFFALO, HOUSTON, NEW YORK, PITTSBURGH

MORE NEW PRODUCTS

General Electric Co, Providence 7, R. I., has the following:

A vinyl jacketed **heating cable** for general purpose applications up to 200F. Output is about 5 w per lineal ft; cable is available in 26, 40, 60 and 100-ft lengths.

Heating cable control consisting of a thermostat with capillary tube and bulb, control setting, and double grounding outlet for connection of heating cables. The control has a range of 30-120F and is rated 20 amp for 230 v ac or less.

Stonco Electric Products Co, Kenilworth, N. J., has a 500-w **floodlight** that produces 115,000 cp. The unit (Catalog No. 64) is of cast aluminum with internal and external cast ribs. Lamp life is stated at 2,000 hr. Bulletin No. 140 has more data.

Panellit, Inc, Panalarm Division, Skokie, Ill., has a **testing device** to check plug-in relays and flashers used in annunciator systems.

Electric Controller & Mfg Co, 4500 Lee Rd, Cleveland 28, Ohio, has added solderless electrical connectors and couplers on its circular all-welded **lifting magnets.** The new connectors and couplers are rated 100 amp continuous and accommodate No. 4, 6 or 8 flexible cable.

Chicago Blower Corp, 9869 Pacific Ave., Franklin Park, Ill., offers a line of **airfoil centrifugal fans** for commercial and industrial ventilating, air conditioning and heating applications. Fans are 13.5 to 143-in. diam and deliver 600 to 1-million cfm. Bulletin A-102, Type A, describes the line in detail.

Henry G. Dietz Co, 12-16 Astoria Blvd, Long Island City 2, N. Y., has added Catalog 110V **vacuum static pressure control** to its line of low pressure switches. The spdt switch is rated 15 amp at 120-250 v ac, ⅛ hp, or 125 va pilot duty.

Morris Machine Works, Baldwinsville, N. Y., offers a low-speed, **continuous-duty pump** (Type Q) to handle abrasive slurries of coal, sand, cement, sludges, etc. The all metal unit is available in 7 models from 2 to 6-in. size. For further data, request Bulletin 186.

American Blower Corp, Detroit 32, Mich., offers a line of **axial fans** for industrial ventilation and air supply. The Series 203 fans feature universal mounting, space economy, straight-line air flow and low installation cost.

American Screw Co, Willimantic, Conn., has a **nylon stop nut** for electrical, electronic, appliance and related uses. It is a one-piece, washer-faced, resilient hexagon nut which is simultaneously self-tapping, locking and insulating. The nut is available in colors and in sizes No. 4, 6, 8, 10 and ¼ in.

Russell & Stoll Co, Inc, 125 Barclay St, New York 7, N. Y., has round and rectangular **floor boxes** for shallow-type below-floor wiring. For further data, request Bulletin 2A-20.

Peerless Electric Co, Electronics Division, Warren, Ohio, has a protection tube **leak-checker** for detecting molten or gaseous leaks in thermocouple protection tubes immersed in liquid materials. It is described in Catalog R-22.

Thomas & Betts Co, Elizabeth, N. J., has designed a **connector tool** (WT-181) to stake one-piece nylon-insulated pigtail connectors. It features elliptical-shaped dies, machined jaws, and forged boron-steel handles with plastic sleeves.

Sorenson & Co, Inc, 375 Fairfield Ave, Stamford, Conn., has a tubeless ac **line voltage regulator** (model MA-1000S) with 0 to 1,000-va output load range. It uses a magnetic amplifier controller circuit with silicone diode reference element.

Holdenline Co, 2300 Scranton Rd, Cleveland 13, Ohio, has a 3-in. deep, surface-mounting **fluorescent fixture.** It is constructed from heavy code gauge steel and framed in glass.

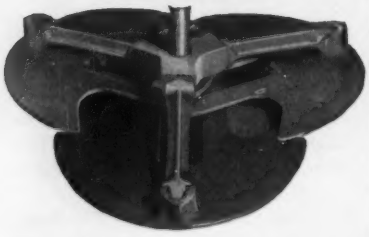
General Electric Co, Bridgeport 2, Conn., has a 19-conductor No. 20 Awg **low-voltage cable** with thermoplastic insulation. It is designed for applications not exceeding 30 v.

Duff-Norton Co, Coffing Hoist Division, Danville, Ill., has an 11-lb **chain hoist** with a standard lift of 7 ft and minimum distance of 9 in. between hooks. It can lift 250 lb.

The Old Reliable

EVERSTICK ANCHORS...

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life



● They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install—made of tough rust-resistant malleable iron—their holding power "tops" all other. Available two-way, three-way, four-way, and cone types. Write for facts.

AN EXCLUSIVE EVERSTICK FEATURE
Exclusive Everstick nut housing. Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO
Manufacturers of "THE ANCHOR OF MERIT"
FAIRFIELD, IOWA

CATALOGS—BULLETINS

● **BUTYL RUBBER COMPOUND:** Results of laboratory tests and service records on a butyl rubber compound for high-voltage cables are given in Bulletin No. EB-27. Anaconda Wire & Cable Co, 25 Broadway, New York 4, N. Y.

● **INDUSTRIAL ENGINES:** Design features, applications, specifications, and optional equipment for two industrial engines are given in an 8-page bulletin. Charts, drawings and diagrams illustrate design and performance of these 190 and 285 hp engines. Westinghouse Air Brake Co, Le Roi Division, Milwaukee 1, Wis.

● **INDICATOR LIGHTS:** Series of indicator lights for heavy-duty industrial applications is described and illustrated in 4-page brochure, Form L-200. Dialight Corp, 60 Stewart Ave, Brooklyn 37, N. Y.

● **TACHOMETERS:** Nine types of portable and permanent tachometers, including an inches per minute indicator, surface speed indicator, and alarm contact tachometer are described in 4-page Bulletin No. 1048. Herman H. Sticht Co, Inc, 27 Park Place, New York, N. Y.

● **INDUCTION HEATING:** Bulletin No. 85-843 describes a general purpose scanner for scanning or single-shot heating of work pieces up to 30-in. long, 10-in. diam. Construction and operation of the scanner, and typical heating operations are described. Both heating fixture and control housing parts are numbered for reference, while drawings illustrate equipment dimensions. Westinghouse Electric Corp, P. O. Box 2099, Pittsburgh 30, Pa.

● **BEAMA CATALOGUE:** Third (1955-56) edition of British Electrical & Allied Manufacturers' Association's Catalogue has 1,034 pages. Sections are classified as follows: Electrical power plant; electrical equipment in industry, transport and communications; domestic and commercial electrical appliances, lighting, acessories and installation material; five-language glossary of technical terms; classified buyer's guide; and trade directory. Published by Iliffe & Sons Ltd, Dorset House, London, England.

● **RECESSED LIGHTING:** A 36-page catalog, titled "Architectural Troffers," describes a redesigned line of recessed lighting equipment. Illustrations and detailed dimensioning data for 1 and 2-ft troffers in all types of ceiling construction are given. Smithcraft Lighting Division, Chelsea 50, Mass.

● **ELECTRICAL INSULATION:** Revised Catalog No. 18 (32 pages) describes electrical insulating materials for repair and maintenance. Insulation Manufacturers Corp, 565 W. Washington Blvd, Chicago 6, Ill.

● **MYLAR:** Applications of Mylar polyester film in the electrical industry are described in 8-page illustrated Booklet MB-4. Properties and characteristics are given. E. I. DuPont de Nemours & Co, Film Department, Wilmington 98, Del.

● **BRONZES:** Engineering properties and applications of five bronzes are covered in 28-page booklet titled "Ni-Vee Bronzes." Tables, graphs, and photographs demonstrate properties and uses. International Nickel Co, Inc, 67 Wall St, New York 5, N. Y.

We take old ones-

make 'em like new

G-E Service Shop

Your local G-E Service Shop makes old distribution transformers new again at about ⅔ the cost of new ones. Our drivers pick up your old or burned-out units. We rebuild them, uprate them, and deliver them to you with a new-transformer warranty. There are 31 G-E Service Shops throughout the country—one near you. 431-18

Progress Is Our Most Important Product
GENERAL ELECTRIC

● **CABLE BOXES:** Various types of splice boxes, with and without armor and conduit fittings, are described and illustrated in 20-page Bulletin BB55. Several types of secondary and primary sectionalizing boxes, air and oil filled, are shown. G&W Electric Specialty Co, 7780 Dante Ave, Chicago 19, Ill.

● **GLASS HEAT PANEL:** A line of glass electric radiant heat panels is the subject of 88-page Catalog No. GC-101. Low voltage and line voltage thermostat controls are also covered. Construction diagrams, and installation pictures and instructions are included. Berko Electric Mfg Corp, 212-40 Jamaica Ave, Queens Village, N. Y.

● **TUBING:** The following were published recently by Babcock & Wilcox Co, Tubular Products Division, Beaver Falls, Pa.:

Pressure tubing and pipe for sub-zero service are covered in 6-page Bulletin TB-357. Properties, characteristics and applications of seamless or welded tubing are included.

Heat exchanger and condenser tubes in seamless and welded types are described with specifications and application data in 8-page Bulletin TB-329B.

Mechanical tubing of alloy steel seamless types is described in 4-page Bulletin TB-360.

Steel tubing for process industries is covered in 8-page Bulletin TB-408. Properties and application data for seamless and welded stainless alloy carbon steels are included.

● **INDUSTRIAL TELEVISION:** Private television system for supervising plant operations is described in 4-page Bulletin No. 508. Taller & Cooper, Inc, 75 Front St, Brooklyn 1, N. Y.

● **SERVICE ENTRANCE EQUIPMENT:** Selection, application, and installation data on fuse panels, service entrance equipment, general purpose and special switches, and panel boards are contained in 32-page booklet, titled "Product Selector." Ratings, dimensions, and construction specifications are included. Clark Controller Co, American Electric Switch Division, 1146 E. 152nd St, Cleveland 10, Ohio.

● **CABLE:** A line of cable products with trade names and applications is the subject of a 16-page general catalog, Bulletin 1096. Two selection charts—one by application and environment and one by cable type—are included. Okonite Co, Passaic, N. J.

● **CONTROL TRANSFORMERS:** A 32-page catalog describes a line of control transformers including autotransformers, machine tool transformers, and special application models. Ratings, dimensions, product features, wiring diagrams, and other data are given in Catalogue GED-2767. General Electric Co, Schenectady 5, N. Y.

● **STEAM CONDENSERS:** A line of barometric steam condensers in sizes to 120-in. diam that handle up to 12,000 gpm is described in 8-page Form 9012-A. Ingersoll-Rand Co, 11 Broadway, N. Y. 4, N. Y.

● **HIGH VOLTAGE TEST SETS:** Revised line of high voltage ac test sets is described in 4-page illustrated Bulletin 5B. Operations and specifications for mobile and semi-portable models are included. Associated Research, Inc, 3760 W. Belmont Ave, Chicago 18, Ill.

(*Continued on page* 128)

MALLEABLE
Integral Spur
GUY HOOKS

Exclusive
CONICAL SPUR

Does away with the need for a lag screw!

Linemen like them — they're easier to mount, require one less piece to juggle.

Troubleshooters like them — they eliminate TV and radio interference caused by loose contact between lag screw and guy hook.

Maintenance men like them — they require less replacements.

Storekeepers like them — there's one less piece to order, to stock and to handle.

Purchasing agents like them — they cost less than a separate guy hook and a lag screw.

Field tested and proved the most economical and serviceable guy hook available — and they're **malleable iron** to outlive, outwear, outlast plain carbon steel hardware, castings, stampings or forgings.

	Max. Bolt Dia.	Max. Strand Dia.	Thimble Dia.
Model P135AX	5/8"	7/16"	1 7/16"
Model P133AX	3/4"	1/2"	1 9/16"
Model P132X	7/8"	3/4"	2 5/8"

SAMPLES AVAILABLE UPON REQUEST

MALLEABLE IRON FITTINGS COMPANY
Pole Hardware Division Branford, Connecticut
N.Y. Office: 30 Church St.
Canadian Mfr. & Dist.: LINE & CABLE ACCESSORIES, Ltd. TORONTO

MIF

Representatives: William J. Cottrell Co., Portland, Ore. • James H. Drew Corp., Indianapolis, Ind. • Industrial Engr. & Equip. Corp., Los Angeles, Cal. • JSG Electric Co., Chicago, Ill., Lee-Smith Co., Miami, Fla. • B. H. McCoin, Knoxville, Tenn. • William J. O'Brien, Memphis, Tenn. • Robert P. Smith & Co., Jacksonville, Fla., E. A. Thornwell, Inc., Atlanta, Ga. • J. P. Voight, Summerville, S. C. • Waltham, DeWitt & Krusi, San Francisco, Cal. • L. G. Wendegatz, Kansas City, Mo. • Williamson Sales Co., Shreveport and New Orleans, La.; Dallas, Houston, Tex.; Pine Bluff, Ark. • O. C. Witte Co., Detroit, Mich.

GET Original FACTORY QUALITY

You are assured of highest quality when you specify Allis-Chalmers core and coil replacement assemblies. These are not rebuilt cores and coils, but completely new units, assembled and dried with the same skill and advanced equipment as standard A-C distribution transformers. All assemblies conform strictly to NEMA standards. They can be used in any make tank.

ALLIS-CHALMERS Core and Coil Replacement Assemblies

Complete Package for installation in 4 Simple Steps

All replacement units are packaged under oil in a specially designed metal container that protects against moisture and damage during transportation. Only 4 simple steps to install. Complete anchoring arrangement included with installation instructions.

Assemblies are available in ratings 25 kva and smaller, 15 kv and below. Use them in either conventional or protected types. Provision for mounting low voltage breaker, and a winding to operate signal light are standard.

Get more information from your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin, for Bulletin 61B6345A. A-4885

Special moisture-proof package.

Complete replacement kit.

ALLIS-CHALMERS

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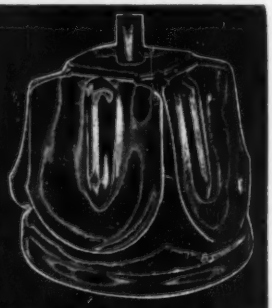
EXPANDING ANCHORS

GRIP-TITE MANUFACTURING CO.

WINTERSET, IOWA

"Pioneers in the Anchor Field"

IN CANADA: LINE AND CABLE ACCESSORIES, LTD. • TORONTO



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ELECTRICAL WORLD

330 W. 42nd St. New York 36, N. Y.

Catalogs—Bulletins

(*Continued from page* 127)

● **TRENCHERS:** Eight models of trenchers and backfillers are described in Bulletin S-120 (4 pages). Capacities, specifications and dimensions are included. Cleveland Trencher Co, 20100 St. Clair Ave, Cleveland 17, Ohio.

● **JACKETING COMPOUND:** Underwriters' Laboratories listing for 80C appliance wire for Bakelite vinyl compound VFD-9033 is reprinted in Extrusion Materials Technical Release No. 4. Bakelite Co, Division of Union Carbide & Carbon Corp, 260 Madison Ave, New York 16, N. Y.

● **EMERGENCY LIGHTING:** A line of automatic emergency lighting equipment is described and illustrated in 8-page Catalogue No. 10. Specifications are included. Electric Cord Co, 195 William St, New York 38, N. Y.

● **PIPING:** New facilities brochure (6 pages) pictorially illustrates fabrication and erection of a line of low and high pressure piping. Mercury Piping Co, Bldg 23, Endicott St, Norwood, Mass.

● **CRANE CONTROLS:** Bulletin CE-400 tells how to modernize cranes through job-engineered electrical controls. The 4-page booklet illustrates new control designs and improvements added to existing cranes. Ederer Engineering Co, 2931 1st Ave S, Seattle 4, Wash.

● **MODEL KITS:** "Do-it-yourself" model kits for establishing equipment arrangement and building dimensions are described in 4-page brochure. Industrial Models, Inc, 2311 Sconset Road, Wilmington 3, Del.

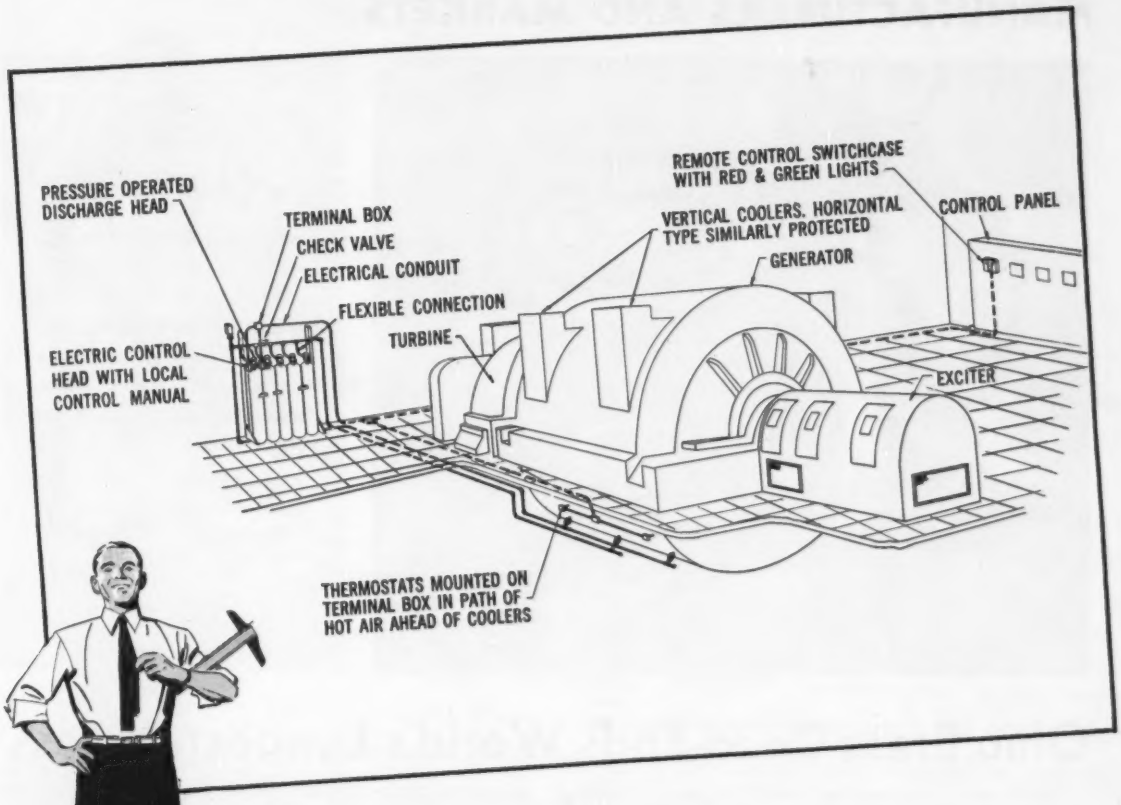
● **STAINLESS FASTENERS:** A 52-page stainless fastener Data Book is thumb-indexed for easy reference. Forty basic fastening devices are illustrated. Thread and size specifications, availability in a variety of corrosion-resistant metals, and engineering data relating to composition, properties, applications, and weights, as well as several tables are included. All-metal Screw Products Co, Inc, Garden City, N. Y.

● **WIRING CONDUIT:** A line of liquid-tight, flexible electrical wiring conduit is described in 6-page Bulletin C-22. American Brass Co, Waterbury 20, Conn.

● **WEATHER SUITS:** A line of lightweight nylon-neoprene waterproof suits for linemen's use is described in 12-page Catalogue No. D-3. Accessories, including footwear, are covered. John E. Dorsey Co, 80 K St, Boston 27, Mass.

● **INTER-OFFICE COMMUNICATION:** How a firm uses an internal, company-owned telephone system to reduce paperwork and speed operations is described in a 4-page illustrated brochure, Circular 1770. Automatic Electric Sales Corp, 1033 W. Van Buren St, Chicago 7, Ill.

● **MATERIALS HANDLING:** An engineering and application booklet describes stresses developed in various type tracks used for overhead materials handling systems. Track peening is also covered in 12-page illustrated Booklet No. 2008-L. Cleveland Crane & Engineering Co, Cleveland Tramrail Division, Wickliffe, Ohio.



SPECIAL FIRE PROTECTION... TAILOR-MADE FOR GENERATORS!

WHEN an electrical failure strikes a generator you have more than a fire loss on your hands! Besides damage to an expensive piece of equipment, you suffer loss of power output while time consuming repairs are made, to say nothing of valuable transmission equipment lying idle!

Being a *special* kind of fire hazard, generators require *special* fire protection. They should really have *Kidde* fire protection!

Because Kidde fire protection is *fully* automatic, it guards generators 24 hours a day. Thermostats see to it that at the first sign of flame, the system actuates instantly, minimizing damage.

Patented Kidde Multijet nozzles also play an important part in the operation of a Kidde system. Because of their unique design, they insure the most efficient dispersion of carbon dioxide throughout a fire-struck generator's run-down time. And after a fire, the CO_2 used in Kidde systems leaves no mess to harm generators or other valuable electrical equipment. It puts out the blaze, then vanishes into thin air!

Kidde engineers will be pleased to inspect your generators – protected or not – and talk over their recommendations with you free of charge. For more information write to Kidde today.

Kidde

The words 'Kidde', 'Lux', 'Lux-O-Matic', 'Fyre-Freez' and the Kidde seal are trademarks of Walter Kidde & Company, Inc.

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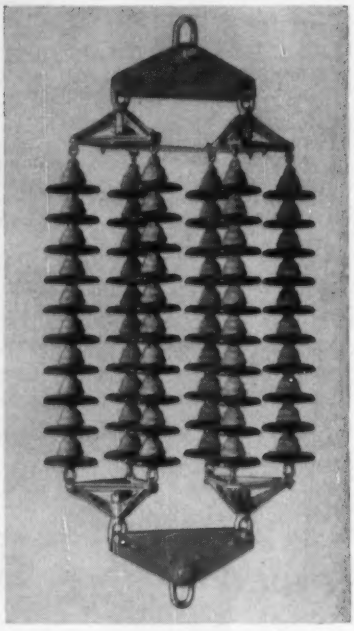


Ohio Brass Dead-Ends World's Longest Spans

This is one of the dead-end assemblies used to suspend four 150-kv transmission lines across Norway's Sognefjord. Ranging from 15,800 to 16,000 ft, these spans are reported to be the longest in the world. They are dead-ended on suspension insulators and strain yokes manufactured by Ohio Brass Co, Mansfield, Ohio.

Two three-string yokes in parallel, using a total of 60 25,000-lb suspension insulators, compose each dead-end. These assemblies support a maximum calculated working load of 51,250 lb, including an ice loading of close to one lb per ft at –13F.

The dead-ends are supported on reinforced concrete A-frames. Brace legs extend down and back from the apex of each frame, while a horizontal arm at right angles to the span carries a three-unit string of suspensions which support the jumper loop.

The Norwegian firm of A/S Betonmast was in charge of structure design and span construction.

Color Films Available on Cable and Plastic Pipe

Rome Cable Corp and Eastman Chemical Products Inc have released 16 mm sound and color motion picture films.

"Cable Makers," a 21-min film, tells about cable making by Rome Cable Corp. Technical aspects are interwoven with personalities. It is a companion to a film, "Cable . . . Pathway of Power" (42 min), made two years ago for prospective customers and engineers. Both films are available on a free loan basis from the Advertising Dept, Rome Cable Corp, Rome, N. Y.

"Plastic Pipelines," a 30-min film, shows several typical installations of Tenite butyrate plastic pipe, how it is laid, and evidence of its resistance to corrosion and clogging. Uses mentioned include power generating plants, irrigation projects and construction industry. This film is available on a loan basis without charge from Eastman Chemical Products, Inc., Kingsport, Tenn.

A-C Offers Labels for OCB Maintenance

Adhesive check-off labels for oil circuit breaker maintenance are now available free of charge to utilities from Allis-Chalmers Manufacturing Co.

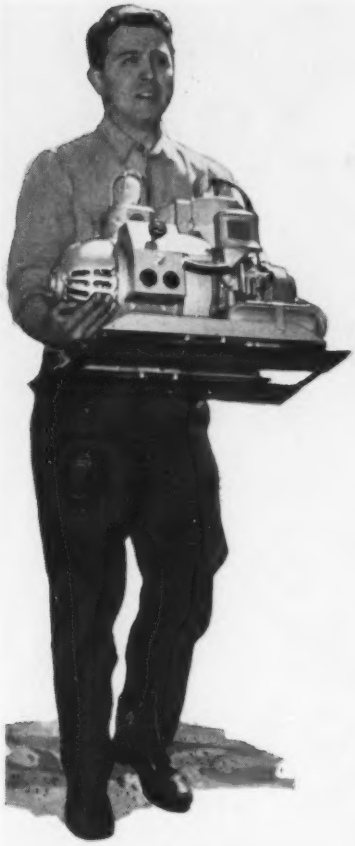
These circuit breaker forms provide a check-off list for standard tests, operation counter readings, etc., for control, operator and breaker. They are similar to the adhesive record forms filling station operators affix to the motorist's car door.

Available for either pneumatic or "Pneu-Draulic" operators, the labels are in pads of 10. Each breaker shipped has an initial supply, but reorder cards on the pads will permit new orders to be obtained from A-C's Boston Works.

Westinghouse Addition

Westinghouse Electric Corp recently started a new warehouse addition to the Richmond, Ky., Lamp Division

(*Continued on page* 132)



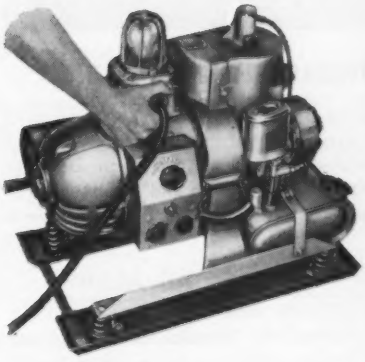
HANDY UTILITY

for Public Utilities

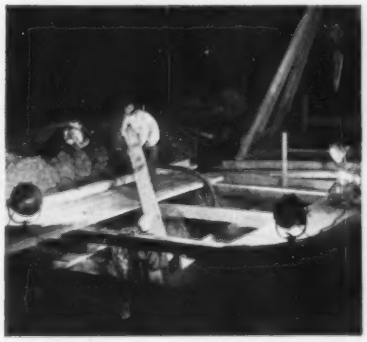
Day and night, there's always a job for a Homelite. You use it for floodlights. You use it for power tools. You use it for standby emergency power. Yes and you use it anyplace . . . *everyplace.*

Small and compact, a Homelite stows away neatly in your truck. Light in weight, one man can pick it up and put it in operation quickly. And famous for its dependability, a Homelite gives you quick-starting and continuous trouble-free performance in all kinds of weather . . . hot, cold or wet.

Write for a free demonstration.



During power failures due to storms or accidents, simply plug into a Homelite, for emergency power requirements.



On night repairs, brilliant floodlights operated by Homelite Generators speed work, save time, save money.

On day repairs, electric power tools operated by Homelite Generators speed work, save time, save money.

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Carryable Pumps • Generators
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Every Kind

Quick Delivery

Plates, Structurals, Bars, Sheets, Tubes, etc. Carbon, Alloy, Stainless Steels, Babbitt Metal.

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Two New Minerallac Quality Products Designed for Jobs Too Heavy for Standard Jiffy Clips

MINERALLAC Hevi-Duty AND Medium JIFFY CLIPS

patent pending

Made of heavier materials! Has exclusive inverted rib, that provides more strength at the bend of clip . . . and, of course, adds the benefits of famous "Snap On" feature!

In stock in Zinc-Plated Steel for Thin Wall or Rigid Conduit up to 6". (Hot Dipped Galvanized may be obtained on order) Can be substituted for malleable clips.

Order From Your Electrical Wholesaler

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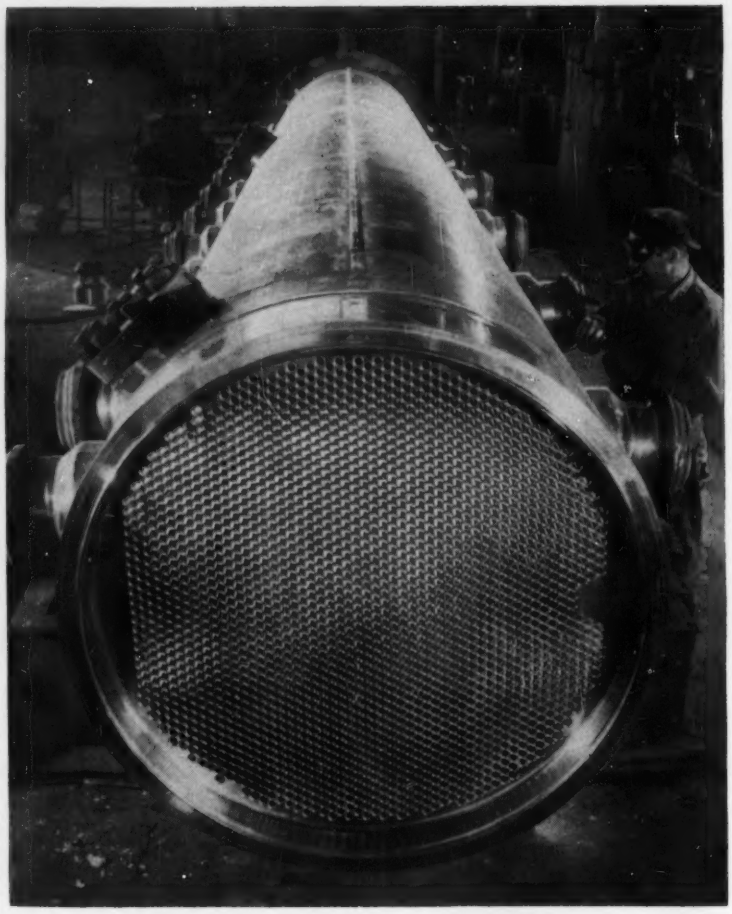

Nuclear Power Apparatus Takes Shape

This steam generator-heat exchanger for a nuclear power plant is pictured nearing completion at Foster-Wheeler Corp's Carteret, N. J., works. The unit is part of the 60,000-kw Shippingport Power Station which Westinghouse Electric Corp is designing and building for Duquesne Light Co and Atomic Energy Commission. Foster-Wheeler is sub-contractor to Westinghouse on this project.

(*Continued from page* 130)

plant. The 16,500-sq ft addition will be built onto the rear of the seven-year old plant and will increase available floor space to 91,500 sq ft. The new addition will be used to store raw materials and finished lamps, and will make more room available for production, advised F. M. Sloan, division general manager.

Aluminum Production

Primary aluminum production in United States, according to Aluminum Association, New York, amounted to 133,689 tons in November, 1955, down from 134,656 tons in October, (all-time record month), but up 12,437 tons from November, 1954. Total for the year through November, 1955, was 1,425,036 tons compared to 1,333,530 tons for the same period in 1954.

Murray Awarded Contract

D. J. Murray Manufacturing Co, Wausau, Wis., has been awarded a $774,500 contract to design, build and deliver 18 175-ton spillway gate hoists for the Long Sault Dam at Mas-

sena, N. Y., for the New York Power Authority.

The gate hoists will weigh about 70 tons each. Overall dimensions of each hoist are 60 ft long, 8 ft wide, 34 ft high. Each dam gate is 52 ft long, 30 ft high, weighs about 120 tons, and will be raised and lowered a total distance of 35 ft.

Penn Transformer Gives 125 Acres for Wildlife

Pennsylvania Transformer Co, Canonsburg, Pa., made a gift of dam and water reservoir sites totaling 125 acres to North American Wildlife Foundation, Washington, D. C. The scenic lake, valued at approximately $750,000, is a few miles northeast of Canonsburg, and will be developed "in the public interest."

W. E. Kerr (left), president of Pennsylvania Transformer, presented his company's deed for the property to C. R. Gutermuth, secretary of the Wildlife Foundation.

M&M BRIEFS

Aluminum Co of America will begin work early this spring on a 44-in. mill that will cold-roll coils of heavy gauge aluminum alloy sheet into light gauges and narrow widths. The $4-million project at Alcoa (Tenn.) Works will take about 18 months.

Frank M. Tait Foundation has been founded in Dayton, Ohio, for charitable, scientific, educational and religious purposes. Tait is chairman of the board of Dayton Pump & Mfg Co and Dayton Power & Light Co. He started the Foundation by placing into it Dayton Pump's assets.

MR. CARNEY answers the $1,929,880 question!

"Since 1946, we have accumulated a total estimated revenue of $1,929,880 on commercial electric cooking," says Mr. H. E. Carney, Manager, Commercial Department, Toledo Edison Company, Toledo, Ohio

READ MORE ABOUT
the utilities' "poor little rich load"

"This revenue has been produced at a total cost of only $125,000," says Mr. Carney. "Our ultimate aim on Commercial Electric Cooking is a 2,500 kw per year increase until 1960. Then we will hit for a 3,000 kw per year increase. The demands on our plant and distributing system are so diversified that commercial cooking load seems to be a high profit load having a high utilization. The all-electric restaurant is the perfect customer. He has good lighting, good summer air conditioning, and continuous year 'round electric cooking. His demand in ratio to connected load is as low as any other kind of customer. His hours use of demand are long. Is it any wonder that we prize such a customer?"

Other top utility executives report as follows:

Mr. B. L. England, President, Atlantic City Electric Co., Atlantic City, N. J., says: "Commercial cooking load diversifies well with other classes of business and provides us with favorable revenue expressed in terms of system demand responsibility."

Mr. Roy S. Nelson, President, Gulf States Utilities Co., Beaumont, Texas, says: "We are most enthusiastic about our commercial electric cooking sales promotion as the equipment produces a fairly high annual revenue per kw of maximum load and offers the customers many benefits over other types of cooking."

You'll find more of these facts, directly from utility men, in the 12-page study made by ELECTRICAL WORLD, which reveals startling facts about Commercial Electric Cooking. For example:

- There are well over ½ million outlets for Commercial Electric Cooking equipment.
- The market is barely scratched—saturation as low as 5% to 15% in some areas.
- The estimated annual revenue from one small fry kettle equals that from four household ranges.

Read the story for yourself in this revealing report. Just have your secretary write to us today for:

COMMERCIAL ELECTRIC COOKING —THE UTILITIES' POOR LITTLE RICH LOAD

(There's no charge)

For the answers to specific questions, please communicate with any of the member companies listed below.

COMMERCIAL COOKING EQUIPMENT SECTION
National Electrical Manufacturers Association • 155 East 44th Street, New York 17, N. Y.

ASSOCIATED PRODUCTS, INC. • CORY CORPORATION • GRISWOLD MANUFACTURING CO.
HOTPOINT COMPANY • MARKET FORGE CO. • ROYCE L. PARKER, INC.
SAVORY EQUIPMENT, INC. • THE SILEX COMPANY • STAR MANUFACTURING CO.
TOASTMASTER PRODUCTS DIVISION McGRAW ELECTRIC COMPANY
WELLS MANUFACTURING CO. • EDWARD L. WIEGAND CO.

Practical service training at Honeywell's school . . .

makes your instrument men more valuable

Your instrument maintenance men can get a real education in the most up-to-date methods for servicing instruments, at Honeywell's Training School. Any organization which uses Honeywell instruments can send maintenance personnel to this school. Tuition costs you nothing, for this school is maintained as a "plus-value" service to Honeywell customers.

Thousands of technicians have either started or augmented their instrument knowledge here. A variety of courses is available, to fit men for the particular kind of maintenance problems they may encounter in their specific jobs. The comprehensive course . . . one of the most complete and intensive offered anywhere . . . covers about thirteen weeks. Other courses cover five weeks and less, to offer condensed instruction of either a basic or "refresher" nature to men who can't be spared for extended periods.

There's nothing academic about this school. The emphasis is placed on practical knowledge. Theory through lectures and textbook study is liberally supplemented by laboratory sessions and actual bench work on all types of instruments and related equipment.

One caution: classes have to be limited to assure thorough attention to all students, so make reservations in advance. Your local Honeywell office will be glad to make arrangements. Call today . . . it's as near as your phone.

Fast-growing Florida P&L finds plus values in

Honeywell service man Hugh McManus (right) advises FP&L electrician on how to check performance of a new **ElectroniK** *recorder.*

At Florida P&L's Cutler station, largest in the state, Honeywell field engineer W. L. Bolton consults with C. L. Wolff, FP&L production supervisor. Any of the system's stations is only a few hours from Honeywell's Tampa office.

Honeywell service facilities

WHEN a utility is expanding as fast as Florida Power & Light, selection of instrumentation becomes doubly important. System capacity has tripled in the past ten years . . . will triple again in the next decade.

To both management and operating personnel, this pace requires something extra of instrumentation. Performance has to meet high standards. Deliveries have to be on schedule. Maintenance requirements must be held to a minimum . . . and service for installation, start-up and emergency readily available.

Honeywell instrumentation meets every one of these specifications and is used extensively in the company's statewide system. The precision, versatility and ruggedness of these instruments make them leaders in performance on turbine, boiler and pump boards.

Equally important is the close-at-hand service, for engineering consultation and maintenance, available from a nearby Honeywell field office. A telephone call brings a trained man within a few hours, to discuss design plans for control centers . . . or to help instruct local technicians in methods of instrument maintenance.

Prompt, competent service by field specialists near you is one of the extra values of Honeywell instrumentation for power plants. A wide range of instruments covers many of the most vital points of measurement and control in modern steam and hydroelectric stations. For a discussion of your specific plant requirements, call your local Honeywell field engineer . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

112 offices throughout the nation

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

J. S. HARTT

Middle West Ups Hartt

Jay Samuel Hartt has been elected president of Middle West Service Co to succeed Edwin Vennard who is resigning the presidency to become managing director of Edison Electric Institute. Vennard continues as a member of Middle West executive committee and board of directors until March 1, when he joins EEI.

Hartt formerly headed his own firm of consulting engineers which merged with Middle West in December, 1954. Since then he has been chairman of Middle West's executive committee.

He has been a consulting engineer in the public utility field since 1924 and has represented utilities in valuation and rate cases throughout the United States and in eight foreign countries.

Hartt was operating consultant and engineering advisor to Utilities Power & Light Corp trustees from 1937 to 1940 throughout the reorganization of that property, and served from 1938 to 1945 as co-trustee in charge of operations of Midland Utilities Co.

A graduate electrical engineer of Michigan State University, Hartt has received two awards for distinguished service from that institution, and an honorary degree of doctor of science from Northland College. He is a director of Northern Indiana Public Service Co and Eastern Utilities Associates.

Line Material Promotes Wheaton, Williams

Line Material Co, a division of McGraw Electric Co, has announced the appointment of Rodgers G. Wheaton as president and has named Earle W. Williams to succeed Wheaton as vice president in charge of marketing and sales.

Wheaton succeeds former president William D. Kyle, Jr., who has resigned to enter the fibre pipe and conduit business.

Wheaton, who has been a vice president since 1952, came with Line Material in 1933. Since then he has served successively as field engineer, ordnance engineer, division manager, manager of the government contracts department, and sales manager before his appointment as vice president. He is a graduate of University of Idaho with a bachelor of science degree, and received his master's degree from Yale University.

Williams, former sales manager, joined Line Material in 1937 upon graduation from State University of Iowa where he received a bachelor of science degree in electrical engineering. After serving as field engineer, he was named assistant sales manager, and later, sales manager at the firm's Kyle plant. He was subsequently transferred to headquarters office in Milwaukee to serve as sales promotion manager and finally as sales manager.

R. G. WHEATON

E. W. WILLIAMS

Before coming to Line Material in 1937 as an engineer at the company's Central Plant, Kyle was associated with Wisconsin Electric Power Co. He then became president of Kyle Corp and remained in that position until the firm's merger with Line Material Co in 1947. At that time he was appointed executive vice president of Line Material. In 1949, when the company became part of McGraw Electric Co, Kyle was named to succeed his father, W. D. Kyle, Sr, as president and general manager.

This NEW Handbook
of engineering data on J-M products

. . . provides valuable information to help you solve many design and operating problems

Here is a new handbook which can be a valuable aid to you in many ways in improving operations and lowering maintenance costs in your plant.

Whether your problem is reducing heat loss, fighting corrosion, sealing gases and liquids, controlling motion, filtering liquids, improving formulae or protecting against fire, weather and wear, this handbook will aid you in finding the solution.

This handbook contains 52 pages of useful up-to-date engineering information on Johns-Manville products used in the process industries. The answers to your thermal insulation problems may be found in the section which shows methods of calculating heat transmission. Also included are tables of heat losses from bare surfaces and equivalent thicknesses of pipe insulation. Graphs provide information on surface resistance for both pipes and flat surfaces.

For your copy of this handbook, simply fill out the attached coupon and return it to us.

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Please send free Johns-Manville Products Handbook for the Process Industries.

Name_____ Title_____

Company_____ Address_____

City_____ Zone_____ State_____

Columbus & Southern Ohio Electric Appoints Grueser Vice President

Robert J. Grueser has been elected a vice president of Columbus & Southern Ohio Electric Co by the utility's board of directors. In his new position, effective January 1, he will be in charge of the company's commercial operations.

Grueser has been assistant to the president of the electric company since 1950, and has also served as commercial manager.

R. J. GRUESER

PERSONAL BRIEFS

South Carolina Electric & Gas Co has appointed **Philip G. Porcher,** formerly manager of community development for the Charleston Division, as manager of the commercial electric department for the entire SCE&G system. **John M. Goodman,** former manager of agricultural development, Charleston Division, has been made manager of the department for both the Charleston and Columbia Divisions; and **W. L. Brunson,** previously electric utilization engineer, Charleston Division, becomes assistant to the Charleston Division commercial manager.

Recently promoted by Connecticut Light & Power Co are **C. Marvin Curtis,** who has been named to the newly created position of manager of the company's office at Glastonbury, and **Robert F. Raytkwich,** appointed field test supervisor for CL&P's entire system.

Cortland G. Pohle has been elected assistant treasurer of Consolidated Edison Co of New York, Inc. He has been manager of the company's stock transfer bureau since 1929.

Gulf States Utilities Co has appointed **E. L. Granau** manager of the Lake Charles Division. **L. M. Welch,** electric operating superintendent of Baton Rouge Division, succeeds Granau as manager of the Beaumont Division.

Joseph T. Ryerson & Son, Inc, has appointed **Charles H. Hallett** as manager of the Wallingford (Conn.) plant.

Newly elected controller of United States Steel Corp is **Wilbert A. Walker,** formerly vice president, accounting. He will continue as a vice president. Walker succeeds **Robert C. Tyson,** who will remain vice chairman of the finance committee. **C. Burton Vernooy** has been designated assistant vice president and retains his present title of assistant controller. And **James L. Ortner** has been named assistant controller.

Joseph A. Frabutt, general sales manager of Federal Telephone & Radio Co, a division of International Telephone & Telegraph Corp, has been appointed a vice president in charge of Federal's Pacific Division in Los Angeles. He is former general sales manager of the company.

E. M. Leonard, former engineer in charge of distribution transformer design at Allis-Chalmers Manufacturing Co Pittsburgh Works, has been promoted to chief engineer, transformer section, Gadsden (Ala.) Works.

George B. Moseley has joined Chase Brass & Copper Co, Inc, a subsidiary of Kennecott Copper Corp, as vice president in charge of sales.

Gerard H. Brandon and **James Hand, Jr,** have been elected to Mississippi Power & Light Co's board of directors.

Daniel F. Gerber, president and chairman of the board of Gerber Products Co, has been elected a director of Detroit Edison Co, filling one of the vacancies created by the resignations of **George R. Fink** and **Reuben B. Crispell.**

Walter A. Stadtler has been appointed director of manufacturing engineering for International Business Machine Corp. He is former manager of IBM technical services laboratory.

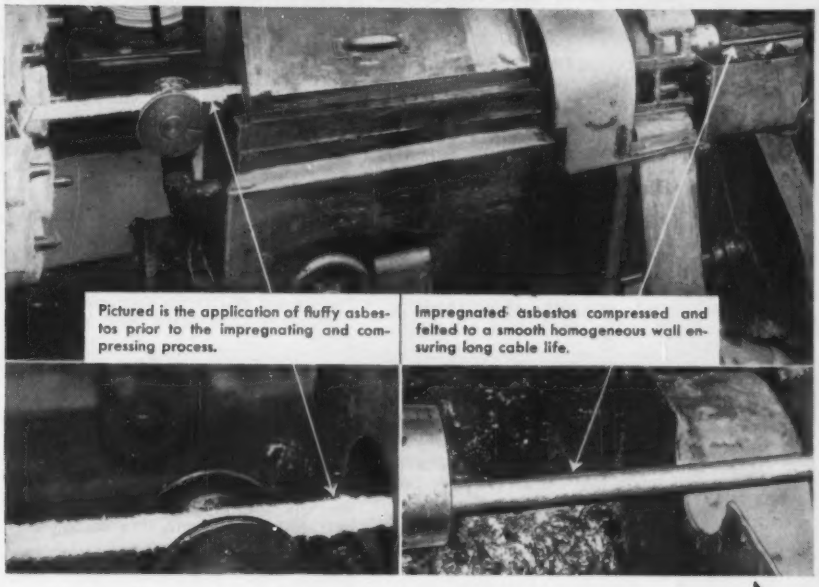
Albert Hansen, Jr, previously manager of advanced engineering for General Electric Co's instrument department, has been named manager of engineering, rectifier department.

Graybar Electric Co has announced that **S. W. Scott,** Pacific district manager, and **E. R. Yonkers,** assistant manager of the Eastern district, have been elected to the company's board of directors.

A. B. Chance Co has appointed **James R. Reed** as market research manager to head the sales department research section recently established with headquarters in Centralia, Mo.

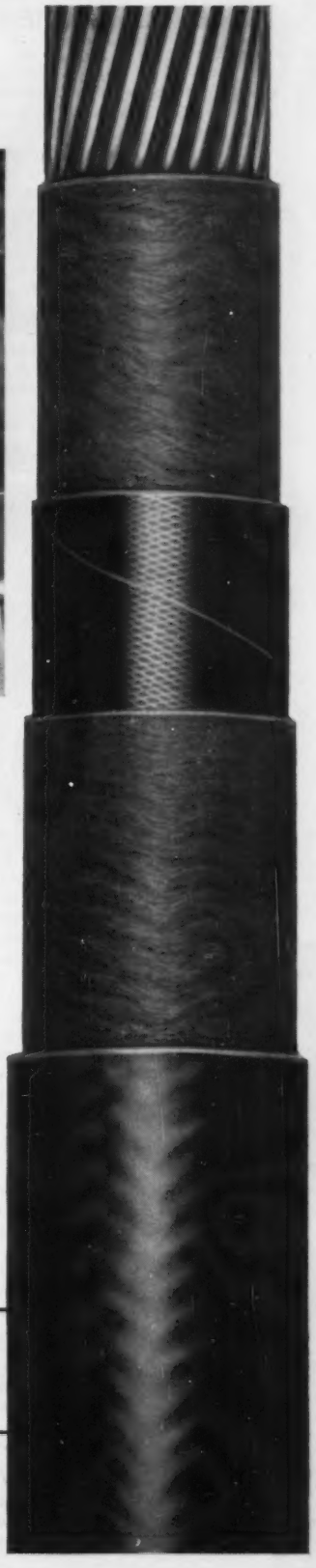
Washington Public Utility District Association recently elected **George Hamilton,** a Douglas County PUD commissioner, as president, with **Clyde Riddell** as vice president and **Harry Swenson** of the Grays Harbor PUD as secretary-treasurer. Southwestern Washington PUD has elected **Willard Campbell** of Benton County PUD as president, with **Earl Carr** of Mason County and **R. A. Perkins** of Lewis County re-elected vice president and secretary respectively.

seamless FELTED ASBESTOS walls add up to long range economical service



Pictured is the application of fluffy asbestos prior to the impregnating and compressing process.

Impregnated asbestos compressed and felted to a smooth homogeneous wall ensuring long cable life.



look beneath the braid

. . . that's where quality begins

Long lasting, trouble-free circuit performance depends on the materials and construction of wire and cables. And a look under the braid shows why Rockbestos A.V.C. (N.E.C. Type AVA) is built to give longer service.

The two seamless, dense felted asbestos walls, compressed and thoroughly impregnated with selected compounds, seal the varnished cambric from heat and moisture.

Dielectric strength stays high under high ambient temperatures. Heat dissipation is uniform. The felted wall construction protects the varnished cambric from rupture in the sharpest bends.

HERE'S HOW YOU BENEFIT*

Get high dielectric values from Varnished Cambric because of its controlled application over seamless felted asbestos walls.

HIGH DIELECTRIC STRENGTH — minimum breakdown voltages for 600 and 1000 volt power cables — 15 KV.

MOISTURE RESISTANCE — same minimum dielectric breakdown — wet or dry — 15 KV on 600 and 1000 volt power cables.

RUGGED CONSTRUCTION — minimum breakdowns after bending tests — 15 KV for 600 and 1000 volt power cables all sizes.

CONTROLLED QUALITY — materials and workmanship and performance under rigid Quality Control.

CUTS MAINTENANCE COSTS — It won't bake brittle, crack or flow in high ambients . . . won't deteriorate with age, or rot when exposed to oil, grease or fumes.

The result: wire failures are eliminated; maintenance costs are held down; plant and equipment operation maintained at top level.

*Write for the test and construction specifications of Rockbestos A.V.C. (N.E.C. Type AVA) available in the new booklet, "Specification RSS-88."

STOCKED COAST TO COAST
Standard Rockbestos A.V.C. construction (N.E.C. types AVA, AVB, etc.) are available for immediate shipment. Call or write nearest branch office.

ROCKBESTOS PRODUCTS CORP.
NEW HAVEN 4, CONNECTICUT

NEW YORK CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS • LOS ANGELES • NEW ORLEANS
OAKLAND, CALIFORNIA

SALES ASSIGNMENTS

COMPANY STAFFS

Electric Machinery Manufacturing Co has named George E. Swift, former Philadelphia district manager, to the newly created position of special representative of the company in Philadelphia office. He is succeeded by Clinton G. Smith.

General Electric Co has appointed Richard C. Schey manager of Construction Materials Division's northwestern district. He succeeds William W. Bryan, now transferred to the Division's Pacific district, Los Angeles, as manager. The division has appointed William J. Donlin, III; Robert W. Eadie; and Thomas S. Hemenway, Jr, as district representatives. Donlin will handle the division's conduit products, wiring devices, and wire and cable lines in the Allentown, Pa., area. Eadie's territory will be the Davenport, Iowa area where he will cover conduit products and wiring device lines; and Hemenway will handle wire and cable products in Chicago area.

S. Morgan Smith Co has reorganized its Valve Division sales territories following the recent death of Maxfield Pease, district manager of northeast territory, Cleveland. In consolidation of that territory, Maurice H. MacDonald, Middle Atlantic district manager, will assume charge of the area from Boston to Pittsburgh. Chicago district manager J. Harold Whisler will cover the western part of the division including Cleveland, Detroit, Cincinnati, and Indianapolis.

Subox, Inc, has announced the following new sales assignments: John Ord Claflin will handle the Philadelphia area, including Pennsylvania, Maryland, Delaware, and southern New Jersey; and Robert E. Noyes has been assigned areas of New York State and Connecticut, headquarters in Hackensack, N. J.

Westinghouse Electric Corp has named P. A. Beckjord manager of electric utility sales for the central region, succeeding P. T. Lagrone who was recently appointed electric utility sales manager for the company.

REPRESENTATIVES

Fisher-Pierce Co, Inc, has appointed Williams & McKinley Sales Co as representatives in St. Louis-Kansas City area.

J. F. Pritchard & Co has appointed W. H. Kidd & Co, Richmond, Va. sales representative for the state of Virginia.

S. Morgan Smith Co has announced the appointment of Moody-Price, Inc, as representative for its Valve Division in Louisiana-Southern Mississippi area.

Subox, Inc, has named R. E. Cunningham & Sons representative in the Southern California area. William J. Cottrell & Associates will represent Subox in western Idaho, in addition to covering Oregon and Washington territories.

MEETINGS CALENDAR

An extended list of coming meetings appears in the last issue of each month

JANUARY

THE INTERNATIONAL HOME FURNISHINGS MARKET—Merchandise Mart, Chicago, Ill., Jan. 9-20.

EDISON ELECTRIC INSTITUTE—Dealer Coordination Committee, Chicago, Ill., Jan. 15-17; Financing & Investor Relations Committee, Hotel Biltmore, New York, Jan. 19; Industrial Relations Committee, EEI Headquarters, New York, Jan. 19; Prime Movers Committee, Warwick Hotel, Philadelphia, Pa., Jan. 30-Feb. 1.

PERSONNEL TESTING LABORATORY—14th Personnel Testing Institute, Rensselaer Polytechnic Institute, Troy, N. Y., Jan. 16-20.

OKLAHOMA UTILITIES ASSOCIATION—Accounting Section, Alvin Hotel, Tulsa, Okla., Jan. 20.

AMERICAN SOCIETY HEATING & AIR CONDITIONING ENGINEERS—Annual Meeting, Sheraton-Gibson Hotel, Cincinnati, Ohio, Jan. 23-25.

NATIONAL RURAL ELECTRIC COOPERATIVE—14th Annual Meeting, St. Louis, Mo., Jan. 23-26.

DOBLE ENGINEERING CO—23rd Annual Conference of Doble Clients, Sheraton Plaza Hotel, Boston, Mass., Jan. 23-27.

AMERICAN MANAGEMENT ASSOCIATION—General Management Conference, Fairmount Hotel, San Francisco, Calif., Jan. 24-27.

AMERICAN SOCIETY FOR ENGINEERING EDUCATION—8th Annual College-Industry Conference, Marquette University, Milwaukee, Jan. 26.

ENGINEERS JOINT COUNCIL—General Assembly, Hotel Statler, New York, Jan. 26-27.

ELECTRICAL EQUIPMENT REPRESENTATIVES ASSOCIATION—Annual Meeting, Edgewater Beach Hotel, Chicago, Ill., Jan. 26-28.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Winter General Meeting, Hotel Statler, New York, Jan. 30-Feb. 3.

FEBRUARY

EDISON ELECTRIC INSTITUTE—Conference Planning sponsored jointly with AGA, William Penn Hotel, Pittsburgh, Pa., Feb. 2-3; Transmission & Distribution Committee, Warwick Hotel, Philadelphia, Pa., Feb. 7-8; Electrical Equipment Committee, Homestead, Hot Springs, Va., Feb 13-14; Commercial Lighting Committee, Hotel Shoreham, Washington, D. C., Feb. 15-16; Meter & Service Committee, Hotel Cleveland, Cleveland, Ohio, Feb. 20-22.

GREAT LAKES POWER CLUB—LaSalle Hotel, Chicago, Ill., Feb. 2-3.

MISSOURI VALLEY ELECTRIC ASSOCIATION—Industrial & Commercial Sales Conference, President Hotel, Kansas City, Mo., Feb. 2-3.

INDUSTRIAL ELECTRIFICATION COUNCIL—National Industrial Electric Heating Conference, Netherland Plaza Hotel, Cincinnati, Ohio, Feb. 6-10.

PENNSYLVANIA ELECTRIC ASSOCIATION—Relay Committee, Benjamin Franklin Hotel, Philadelphia, Pa., Feb. 9-10; Electrical Equipment Committee, Penn Harris Hotel, Harrisburg, Pa., Feb. 9-10; Systems Operation Committee, Hotel Statler, New York, Feb. 16-17.

SOUTHEASTERN ELECTRIC EXCHANGE—Personnel Administration Section, Buena Vista Hotel, Biloxi, Miss., Feb. 9-10.

ROCHESTER ELECTRICAL EXPOSITION—War Memorial Building, Rochester, N. Y., Feb. 18-25.

NATIONAL ADEQUATE WIRING BUREAU—12th Annual Conference, LaSalle Hotel, Chicago, Ill., Feb. 23-24.

AMERICAN MANAGEMENT ASSOCIATION—2nd Annual Electronics Conference & Exhibit, Hotel Commodore, New York, Feb. 27-29.

AMERICAN SOCIETY FOR TESTING MATERIALS—Committee Week, Hotel Statler, Buffalo, N. Y., Feb. 27-March 2.

MARCH

SOUTHERN SAFETY CONFERENCE, INC.—Southern Safety Conference & Exposition, Hotel Biltmore, Atlanta, Ga., March 4-6.

SOUTHEASTERN ELECTRIC EXCHANGE—23rd Annual Conference, Boca Raton, Fla., March 12-14.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS—12th Annual Conference, Hotel Statler, New York, March 12-16.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION—Edgewater Beach Hotel, Chicago, Ill., March 12-16.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Spring meeting, Multonomah Hotel, Portland, Ore., March 18-21.

ILLINOIS INSTITUTE OF TECHNOLOGY—18th Annual American Power Conference, Hotel Sherman, Chicago, Ill., March 21-23.

OKLAHOMA UTILITIES ASSOCIATION—Annual Convention, Biltmore Hotel, Oklahoma City, Okla., March 22-23.

PACIFIC COAST ELECTRICAL ASSOCIATION—Engineering & Operating Section, Palace Sheraton, San Francisco, Calif., March 22-23.

* **EDISON ELECTRIC INSTITUTE**—22nd Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill., March 26-29.

APRIL

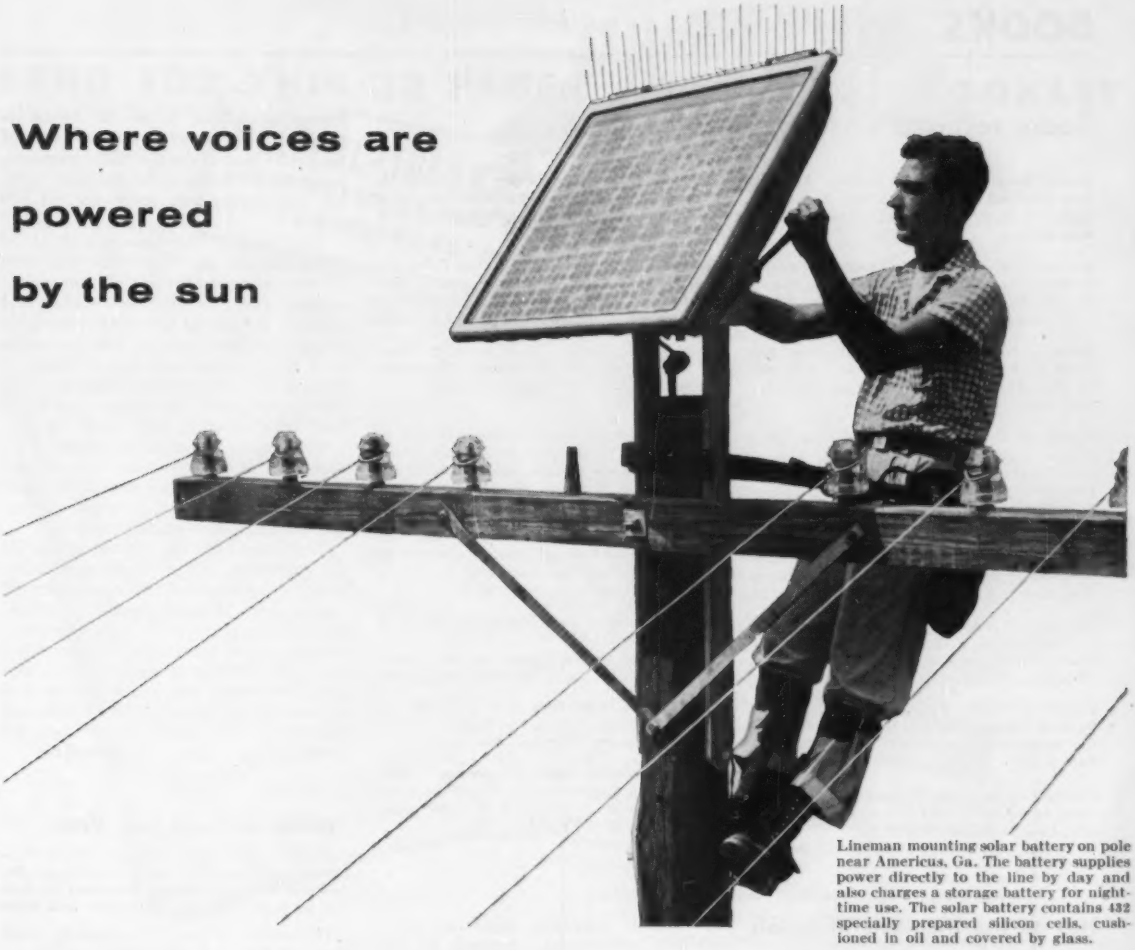
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—South West District Meeting, Baker Hotel, Dallas, Tex., April 2-4; Great Lakes District, Fort Wayne, Ind., April 16-18.

ELECTRICAL MAINTENANCE ENGINEERS ASSOCIATION—8th National Biennial Electric Industry Show, Shrine Exposition Hall, Los Angeles, Calif., April 5-7.

MIDWEST RESEARCH INSTITUTE—Symposium for Management on Applications of Analog Computers, University of Kansas City, Kansas City, Mo., April 10-11.

* Additions this week

Where voices are powered by the sun

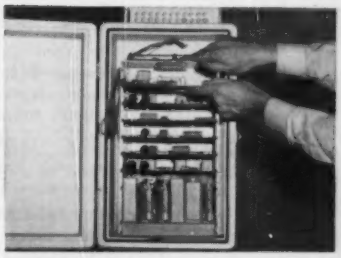


Lineman mounting solar battery on pole near Americus, Ga. The battery supplies power directly to the line by day and also charges a storage battery for night-time use. The solar battery contains 432 specially prepared silicon cells, cushioned in oil and covered by glass.

A new kind of telephone system developed by Bell Telephone Laboratories for rural areas is being operated experimentally by electric current derived from sunlight. Electric current is generated as sunlight falls on the Bell Solar Battery, which a lineman is seen adjusting in position.

The exciting achievement is made possible by two Laboratories inventions—the solar battery and the transistor. The new system uses transistors to the complete exclusion of electron tubes. Transistors require little power and this power can be easily supplied by the solar battery.

Compact and economical, the transistorized system can carry several voices simultaneously without interference. It has proved its ruggedness by standing up to heat, cold, rain and lightning. It promises more and improved telephone service for rural areas and it typifies the Laboratories' continuing efforts to make American telephony still better each year.



In sending and receiving terminals, transistors are used as oscillators, amplifiers and regulators, and for signaling.

One of the transistors (actual size) used in the new system. New ideas, new tools, new equipment and new methods had to be developed for this project.

BELL TELEPHONE LABORATORIES

IMPROVING AMERICA'S TELEPHONE SERVICE PROVIDES CAREERS FOR CREATIVE MEN IN SCIENTIFIC AND TECHNICAL FIELDS

BOOKS

Books received since October 28, 1955

Electric Power Stations—4th Edition. By T. H. Carr. Published by Chapman & Hall, 37 Essex St., London W. C. 2, England. 832 pages, illustrated. Price 80/-net.

Electronic Transformers and Circuits—2nd Edition. By Reuben Lee. Published by John Wiley & Sons, Inc. 440 Fourth Ave, New York 16, N. Y. 360 pages, illustrated. Price $7.50.

Safety in Industry. By D. I. MacFarlane. Published by Philosophical Library, Inc. 15 E. 40th St. New York 16, N. Y. 71 pages, illustrated. Price $6.00.

Review of Current Research and Directory of Member Institutions, 1955. Published by the Engineering College Research Council of the American Society for Engineering Education. 352 pages. Price $2.00.

Semiconducting and Luminescent Materials and Their Applications. By Battelle Memorial Institute. Published by John Wiley & Sons, Inc. 440 Fourth Ave., New York 16, N. Y. 199 pages. Price $5.00.

Hydraulic & Pneumatic Operation of Machines. By H. C. Town. Published by Philosophical Library, Inc. 15 East 40th St. New York 16, N. Y. 192 pages, illustrated. Price $7.50.

Control of Nuclear Reactors and Power Plants. By M. A. Schultz. Published by McGraw-Hill Book Co, New York 36, N. Y. 313 pages, illustrated. Price $7.50.

Electricity in the Home. By Emanuele Stieri. Published by Barnes & Noble, Inc. New York 3, N. Y. 405 pages, illustrated. Price $1.75.

Protective Current Transformers & Circuits. By P. Mathews. Published by the MacMillan Co. 60 Fifth St. New York 11, N. Y. 253 pages, illustrated. Price $7.00.

The ISCC-NBS Method of Designating Colors and a Dictionary of Color Names. By Kenneth L. Kelly and Deane B. Judd. Published by National Bureau of Standards. 158 pages, illustrated. Price $2.00.

Elektrische Stobfestigkeit. By R. Strigel. Published by Springer-Verlag, Reichpietschufer 20, Berlain W 35, Germany. 397 pages, illustrated. Price DM 43.50.

Der Transistor - Ein Neves Verstarker-element. By Joachim Dosse. Published by Verlag von R. Oldenbourg, Graphische Betriebe, Rosenheimer Strasse 145, Munchen, Germany. 105 pages, illustrated. Price DM 11.80.

Illuminating Engineering Course. By H. Zijl. Published by Philips Technical Library. Distributed by Cleaver Hume Press Ltd, London W. 8, England. 243 pages, illustrated. Price $4.50.

Vacuum Valves in Pulse Technique. By P. A. Neeteson. Published by Philips Technical Library. Distributed by Cleaver Hume Press Ltd. London W 8, England, 170 pages, illustrated. Price $4.50.

Introduction to TV-Servicing. By H. L. Swaluw and J. Van Der Woerd. Published by Philips' Technical Library. 266 pages, illustrated. Price $5.50.

Principles of Nuclear Reactor Engineering. By Samuel Glasstone. Published by D. Van Nostrand Co, Inc. 120 Alexander St., Princeton, N. J. 861 pages, illustrated. Price $7.95.

How to Use Magnetic Materials

Magnetic Materials in the Electrical Industry. By P. R. Bardell. Published by MacDonald & Co, Ltd, London, England. 288 pages, illustrated. Price 32s 6d.

This new book presents information on the production, measurement, and application of some magnetic materials. The greater portion is devoted to properties of materials and measurements rather than to application of these materials.

Early chapters present material on terminology and units, and theoretical considerations. Very elementary mathematics is used in explaining the theory. In fact mathematics is used quite sparingly in the text. As far as the power engineer is concerned the only other part of the book that has direct bearing on his profession is a chapter on power-frequency applications. The other application chapters deal with communication equipment, magnetic recording, transductors, and transducers.

One of the most outstanding features of the book is a glossary of terms in the appendix. This glossary defines all the magnetic terms, gives their symbols, and the practical unit of measurement.

Book should appeal primarily to the engineers directly concerned with the use of magnetic materials as a product component. Appeal to the users of such products should not be as great.

Selecting the Right Material

Handbook of Engineering Materials. Edited by Douglas F. Miner and John B. Seastone. Published by John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y. 1391 pages, illustrated. Price $17.50.

The editors of this handbook, themselves experts of long and varied experience, have drawn upon the knowledge and skill of 50 specialists to produce an amazingly complete reference of the materials of manufacturing and construction.

Contents are arranged in four sections. First of these provides general information pertaining to all classes of material, such as procurement and test standards, analytical methods, physical and mathematical tables. Following this is a long section on metals, both ferrous and non-ferrous. Designations, classifications, physical characteristics, applications, shop practices, and finishes are well covered. Space is devoted, also, to some 48 rare metals such as barium, boron, radium, thorium, and uranium, although information about some of these is meagre. And special applications of magnetic materials, electrical contacts, bearings, solders, brake facings, powder metallurgy and corrosion fill 135 pages.

The third section covers with equal thoroughness the properties and uses of non-metals. Insulating materials include wood, paper, fiber, rubber and plastics. Finishing materials, and their application and testing, are well covered. Commercial fuels are included, as well as carbon products. And the section closes with 125 pages about industrial chemicals and lubricants.

The fourth section is confined to materials of construction. Included are cement, concrete, roadbeds and foundations along with timber, rope, protective coatings and glass products.

This handbook was written primarily for engineers, and assumes basic technical knowledge and the vocabulary of engineering. A copy should be available to every engineer who has occasion to select materials for manufacturing, operation, or maintenance. The extensive index will assist him to find the desired information. And frequent references will guide him when he seeks more complete information.

Transistors Open New Vista

Transistors—Theory and Applications. By Abraham Coblenz and Harry L. Owens. Published by McGraw-Hill Book Co, Inc, 330 West 42nd St, New York 36, N. Y. 328 pages, illustrated. Price $6.00

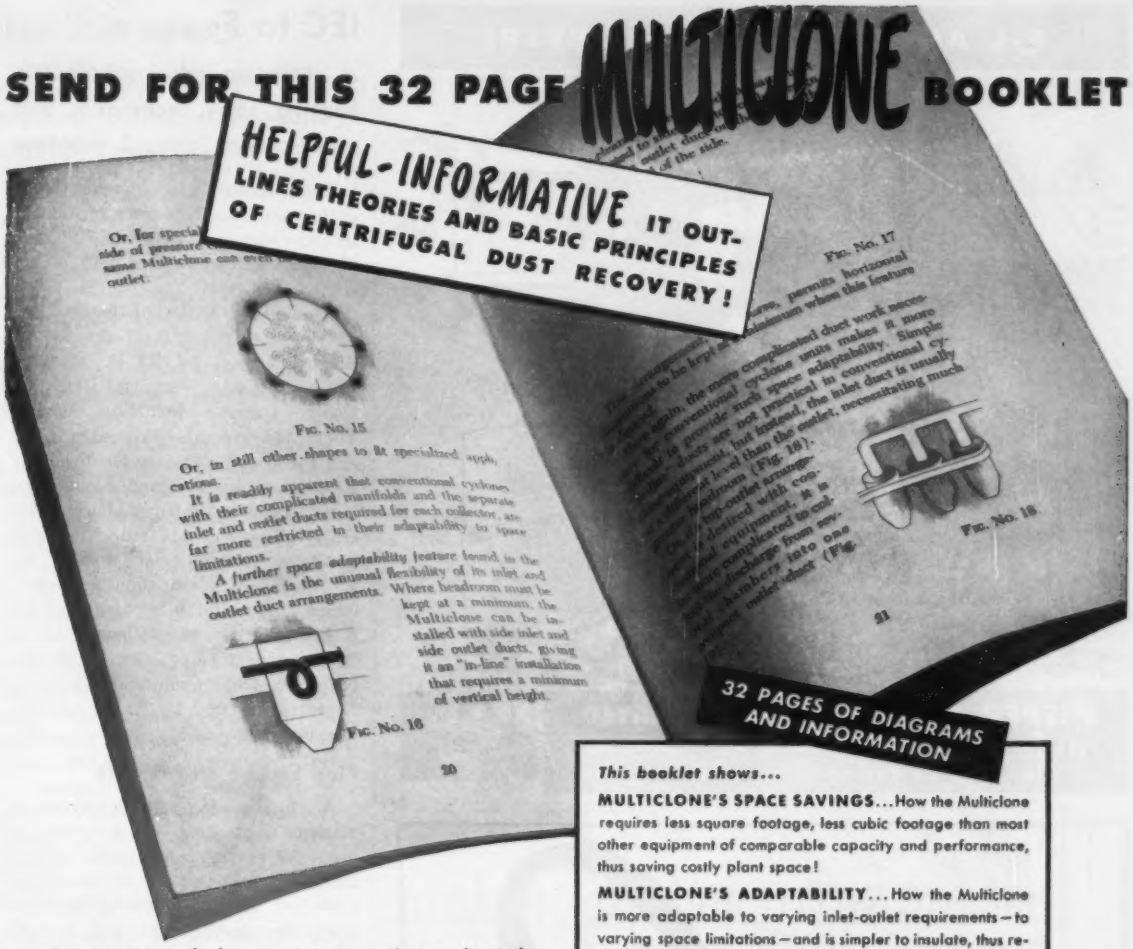
Discovery of the transistor in 1942 was greeted by scientists as an opening into the secrets of solid-state physics. But to electrical engineers today it is much more important for its impact on electronics and communication.

This book originated with a series of lectures at Evans Signal Laboratory. Its first published version was a series of articles in *Electronics*. Subsequent revision of the published material and addition of four new chapters to incorporate advances in circuitry, manufacture, and special developments have made it a comprehensive treatise.

Starting with a short history, the authors move quickly and clearly through the theory of transistors to their characteristics and application. Information has been incorporated from many sources. Mathematical analyses are involved, too, but so skillfully handled that they can be passed over without losing significance.

Direct application of this book to utility engineers is, of course, restricted to those engaged in communication and electronic controls. But other engineers would welcome the opportunity to read about this important new discovery.

SEND FOR THIS 32 PAGE MULTICLONE BOOKLET


HELPFUL-INFORMATIVE IT OUTLINES THEORIES AND BASIC PRINCIPLES OF CENTRIFUGAL DUST RECOVERY!
FIG. No. 15
Or, in still other shapes to fit specialized applications.
It is readily apparent that conventional cyclones with their complicated manifolds and the separate inlet and outlet ducts required for each collector, are far more restricted in their adaptability to space limitations.
A further space adaptability feature found in the Multiclone is the unusual flexibility of its inlet and outlet duct arrangements. Where headroom must be kept at a minimum, the Multiclone can be installed with side inlet and side outlet ducts, giving it an "in-line" installation that requires a minimum of vertical height.
FIG. No. 16
20
FIG. No. 17
FIG. No. 18
21
32 PAGES OF DIAGRAMS AND INFORMATION

NO MATTER whether you are now using mechanical dust recovery equipment or are planning the installation of such equipment at some future date, here is a booklet that is full of helpful and valuable information on centrifugal dust recovery. It not only explains the basic methods and principles involved, but also shows the important differences between small and large diameter separating tubes, shows how to simplify your duct work and reduce installation costs, and outlines many other important factors to be considered in selecting mechanical dust recovery equipment.

In addition, this informative booklet illustrates and explains how MULTICLONE'S unique *vane* design is fundamentally different...how it makes possible greater compactness, simpler installation, high recovery of the small particles as well as the medium and coarser ones, and many other facts on MULTICLONE advanced design.

A limited supply of these booklets is available for free distribution to those interested in mechanical recovery equipment and methods. Write for your copy today.

This booklet shows...

MULTICLONE'S SPACE SAVINGS...How the Multiclone requires less square footage, less cubic footage than most other equipment of comparable capacity and performance, thus saving costly plant space!

MULTICLONE'S ADAPTABILITY...How the Multiclone is more adaptable to varying inlet-outlet requirements—to varying space limitations—and is simpler to insulate, thus reducing installation costs!

MULTICLONE'S EFFICIENCY...How Multiclone's multiple *small diameter* tubes, made possible by its exclusive vane design, give higher centrifugal forces and more complete cleansing of *all* suspended particles—even small ones of 10 microns and less!

MULTICLONE'S LOW MAINTENANCE...How the Multiclone has no high speed moving parts to repair or replace, no pads or filters to clean or renew, nothing to choke gas flow or increase draft losses as suspended materials are recovered. Multiclone draft losses remain uniformly low—recovery efficiencies uniformly high—at all times!

Make sure that a copy of this helpful booklet is in your reference files by sending for your copy now!

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TURBULAIRE Spray Dryers

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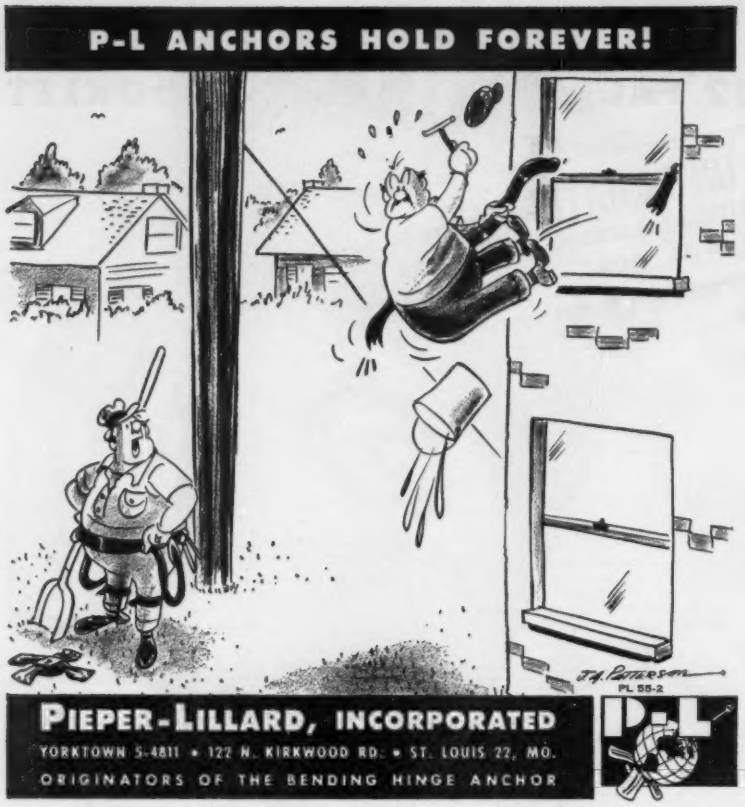
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P-L

WHAT'S NEW?

We're interested . . . and so are Electrical World's readers! Are you all steamed up about your new product, new plant or expanded facilities? Got some red-hot new literature, research results or a new production method? Any financial, product design changes —shifts in executive personnel—consolidations? Whatever you have, *World* makes it easy to bring it to the reader's attention. Write for the booklet . . . *"How To Get Maximum Value Out of The News Releases You Write For Electrical World."*

IEC to Feature . . .

. . . talks on industrial electric heating, sales, techniques, and processes at annual meeting

The Industrial Electrification Council has announced its program for the second National Industrial Electric Heating Conference to be held in Cincinnati, Feb. 6-10.

Among the topics of unusual interest are: "Industry's Evaluation of Electric Heat," by R. E. Morken, Chrysler Corp; "Radiant Heating Using Lamps, Including Quartz Tubes," by Morgan Christensen, General Electric Co; "Space Heating," by B. M. Lyons, Cleveland Electric Illuminating Co; "Vacuum Melting," by G. W. Rengstorff, Battelle Memorial Institute; "Vacuum Heat Treating," by R. R. Giler, Westinghouse Electric Corp; "Ingot and Billet Heating," by B. E. McArthur, Magnethermic Corp; "Continuous Casting," by H. B. Osborn, Jr., Ohio Crankshaft Co; and "Modern Metals," by R. R. LaPelle, Westinghouse.

Plan Session on Markets

A whole session will be devoted to markets and selling. Cost factors of industrial heating applications will be discussed, followed by an economic study of industrial heating applications, the development and use of sales promotional material, and an electric heating sales program.

Other sessions will be devoted to ovens, furnaces, metal sheath electric heaters, heat treating, process heating, and heating applications. A panel of oven experts will consider problems submitted by four utility industrial power salesmen.

Special forums (running concurrently) on heating applications will discuss the foundry; the steel industry; the automotive industry; and textiles, plastics, and paper industries; plastics fabrication; metal fabrication; chemical industry, and the heat pump.

Enrollment will be limited to about 150 delegates. This will include power sales engineers and industrial heating specialists affiliated with electric utilities and IEC equipment makers.

This is the second IEC heating conference. It aims to present the latest technical information, sales training ideas, information on industrial electric heating, and new knowledge to help stimulate sales of electric heat.

Plan Revealed . . .

. . . by Washington PUD for unique power sales contracts for Priest Rapids project

Details of the unique power sales contracts by which the Grant County Public Utility District of Ephrata, Wash., expects to finance the $349-million Priest Rapids hydro-electric project on the Columbia River were revealed Dec 15 by Glenn Smothers, PUD manager, at the annual meeting of the Washington PUD Association in Seattle.

A copy of the contract was given to each of the PUDs present and other copies now are in the hands of private and public utilities in Washington, Oregon, Idaho and Montana.

Since the Congressional act allowing the PUD to build the dam provides that some of the power go outside Washington state, 35% of the 1.2 million kw to be generated will be allocated to Oregon, Idaho and Montana, Smothers said. Purchasers in those states desiring power from the project must sign contracts by Jan. 15, however, or the power will be made available to prospective purchasers within Washington, said Smothers.

A $20 per Kwyr Rate Set

The contracts are unusual in that they provide for sales of a percentage of the project's entire capacity, rather than for a given number of kilowatts, with the price to be determined by the same percentage of the project's total annual cost. This price is estimated at $20 per kwyr during the bond payment period of about 35 years and $3.91 per kwyr thereafter, with delivery at the dam.

Although the contracts are for 50 years, the Grant PUD reserves the right to reduce the power allocation of any purchaser within the state by as much as a third on five years notice, to supply "the anticipated electric loads of ultimate consumers located within Grant County." The PUD expects to continue to obtain its own power supply from Bonneville Power Administration at a lower rate than it must charge for Priest Rapids power, at least until 1965, leaving all the Priest Rapids power available for contract. By 1985 it expects to use half of the Priest Rapids power within the county.

Like Bedcovers for your Engines...

KIM Hotstart

ENGINE PRE-HEATER

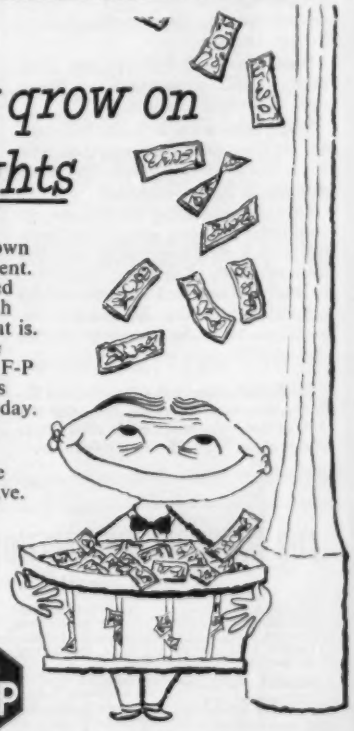
KIM HOTSTART pre-heaters circulate hot water through the engines when they are not in use; protect them against bitterest winter cold; keep them rarin' to go at the touch of the starter. Here are other advantages:

Saves warm-up time
Reduces fuel consumption
Eliminates necessity of heated terminals
Prolongs battery life

There's a KIM Hotstart to fit every gas or diesel engine. Let your automotive supplier show you how KIM Hotstart cuts the cost of winter damage. Or write for literature.

KIM HOTSTART MANUFACTURING CO.
West 917 Broadway, Spokane 1, Washington

making money grow on .....streetlights



Although no one as yet has grown money on trees, *streetlights* are different. At least when some economy-minded utility engineer has equipped them with Fisher-Pierce photoelectric controls, that is. On low *first* cost, on reduced *installation* cost, and minimum *maintenance* cost, F-P units are producing substantial savings for the hundreds of utilities using them today.

The F-P *Series 64400* control is a good example. Low initial cost and infrequent repair make it practical to use *one 64400 per lamp*, as many utilities have.

Add to this economy the *basic* advantages of F-P photoelectric lighting controls: light *when* it is needed, independent of time, season or weather; *dependable* operation, a result of Fisher-Pierce's ten years of experience in this field. Facts and figures for the asking.

FP

THE FISHER-PIERCE COMPANY, INC.
82 Pearl Street, So. Braintree, Boston 85, Mass.

EXPORT:
Philips Export Corp., 100 E. 42nd Street, New York 17, N. Y.
In Canada:
Northern Electric Co., Ltd.

EMPLOYMENT OPPORTUNITIES

The Advertisements in this section include all employment opportunities—executive, management, technical, selling, office, skilled, manual, etc.

Positions Vacant
Positions Wanted
Part Time Work

Civil Service Opportunities
Selling Opportunities Wanted
Selling Opportunities Offered

Employment Agencies
Employment Services
Labor Bureaus

DISPLAYED —RATES— **UNDISPLAYED**

The advertising rate is $19.15 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

$1.50 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Box Numbers—counts as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to Agency Commission.

Send NEW ADS to ELECTRICAL WORLD, 330 W. 42nd St., N. Y. 36, N. Y., for January 23rd issue closing January 13th

Engineers and Designers
Wanted By
Southern Services, Inc.
Birmingham, Ala.

This is an opportunity to associate yourself with one of the large, progressive and firmly established engineering organizations in the Southeast, engaged in a long lasting and extensive steam and hydro expansion program for a utility system with present capacity of 3,000,000 KW, operating in Alabama, Florida, Georgia and Mississippi.

These positions are now open in Birmingham:

Senior Civil Engineers with B.S. in Civil Engineering and 10 years experience in Hydro Generation Project Design.

Designers with B.S. in Civil Engineering and experience in Structural Concrete Design.

Designers with B.S. in Mechanical or Electrical Engineering, with or without experience in Generating Station Design.

Excellent working conditions, air conditioned offices, employee benefits including insurance and retirement plan. Excellent opportunity for professional growth in the industrially active Southeast. Inspection trips to projects under construction.

Send brief resume to Chief Design Engineer, Southern Services, Inc., 600 No. 18th Street, Birmingham 2, Ala. State salary expected and when available.

DO YOU WANT AN ENGINEERING JOB WITH A FUTURE?

The Ohio Valley Electric Corporation,

a new Company operating two large steam generating plants in the Ohio Valley has opportunities now for TEST (efficiency), METER, RELAY, and COMMUNICATIONS Engineers. If you have an engineering degree and are interested in a fine opportunity, write Personnel Director, Box 468, Chillicothe, Ohio.

UTILITY EXECUTIVE ENGINEER

LOCATION: Fast growing electric utility company in a large, progressive city in Florida, the nation's number one state in rate of industrial growth, and number two state in population growth.

RESPONSIBILITIES: Management of all engineering operations of company. Supervision and training of engineering department.

EXPERIENCE: Diversified engineering background in electric utility company, including a minimum of three years supervising engineers. Individual must have leadership ability, with potentiality for further advancement. Ability will be regarded as of greater importance than just years of experience.

AGE: 35-45 desirable.

SALARY: Commensurate with the high level qualifications demanded by the position.

REPLY: Confidentiality assured. Write, giving summary of qualifications to

P-8303, Electrical World
330 W. 42 St., New York 36, N. Y.

FOR RATES OR INFORMATION About Classified Advertising

Contact The McGraw-Hill Office Nearest You

ATLANTA, 3
1321 Rhodes
Haverty Bldg.
WAlnut 5778
W. LANIER

BOSTON, 16..
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HUbbard 2-7160
P. McPHERSON

CHICAGO, 11
520 No. Michigan Ave.
MOhawk 4-5800
W. HIGGINS

CLEVELAND, 15
1510 Hanna Bldg.
SUperior 1-7000
C. J. LOUGHLIN

DALLAS, 2
Adolphus Tower
Main & Akard Sts.
J. CASH

DETROIT, 26
856 Penobscot Bldg.
WOodward 2-1793
L. SEEGAR

LOS ANGELES, 17
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MAdison 6-4323
C. W. DYSINGER

NEW YORK, 36
330 West 42 St.
LOngacre 4-3000
R. LAWLESS
W. SULLIVAN
D. COSTER

PHILADELPHIA, 3
17th & Sansom St.
Rittenhouse 6-0670
E. MINGLE

SAN FRANCISCO, 4
68 Post St.
DOuglas 2-4600
R. C. ALCORN

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)
LOS ANGELES: 1111 Wilshire Blvd. (17)

POSITIONS VACANT

Junior Electrical Engineers—Five Graduates for power stations and substation electrical design. Location New York with established Service Organization for a large group of electrical utilities. Requirements: 1 to 3 years with leading electrical equipment manufacturer, G.E. or Westinghouse test course, or actual electric design, operation, construction experience on steam, diesel or hydro plants and substations. Limited foreign travel possibilities in future. Reply stating age, education, experience, personal particulars, and minimum salary expected. P-8794, Electrical World.

Graduate Electrical Engineers with or without experience for electric public utility. System protection, substation and distribution design work available. Please write full particulars: Personnel Director, P. O. Box 330, Hartford 15, Connecticut.

Electrical Engineer—Graduate—2 to 5 years experience—protective relay work with electric utility. Permanent position long established supervisory-consulting organization. Headquarters New York. Some travel Latin America. Salary commensurate with experience. Reply stating age, education, experience, personal particulars and minimum salary expected. P-8795, Electrical World.

Young Electrical Engineer—Power Option— Recent graduate or man with 1 or 2 years experience. Good opportunity. Permanent position with long established electric utility in Costa Rica. Knowledge Spanish necessary. Reply stating age, education, experience, personal particulars and minimum salary expected. P-8824, Electrical World.

EMPLOYMENT SERVICES

Salaried Personnel, $5,000-$30,000. This Confidential service established 1920, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personnel consultation invited. Jira Thayer Jennings, P. O. Box 674, Manchester, Vermont.

Salaried Positions $5,000 to $35,000. We offer the original personal employment service (established 46 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered, present position protected. Ask for particulars, R. W. Bixby, Inc., 558 Brisbane Bldg., Buffalo, N. Y.

POSITION WANTED

Power Engineer; Registered P.E., 35, family, with extensive responsible experience in power system studies, relay applications and settings, and some field testing background. Desire position offering variety and growth opportunity, utility or industry. PW-8812, Electrical World.

SELLING OPPORTUNITY WANTED

Electrical Manufacturers agent. North and South Carolina, calling on distributor, industrial and OEM accounts, warehouse, office staff, 2 salesmen on road. Desire affiliation with live accounts this area. Commission basis only. RA-8731, Electrical World.

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

BUSINESS OPPORTUNITIES — EQUIPMENT - USED or RESALE

UNDISPLAYED RATE:

$1.50 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

PROPOSALS, $1.50 a line an insertion.

BOX NUMBERS count as one line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE:

The advertising rate is $14.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

SEND NEW ADVERTISEMENTS TO: 330 W. 42 ST., N. Y. 36, N. Y., for January 23rd issue closing January 13th

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FOR SALE

WESTINGHOUSE SWITCH GEAR

New 3 Unit Westinghouse Metal Clad Indoor Lift Type Switch Gear, 6900 Volt, 100 Amp., Housing Code A, with one Breaker Oil Circuit Style #18Y9308, Type B-20-B, 600 Amp., 15,000 Volt, 3 Pole. Complete with Current and Potential Transformers, Necessary AC and DC Ammeters, and AC Voltmeters, Powerfactor Meters, Wattmeters, Temperature Indicators, Type CA Differential Relays, Type CO Induction Overcurrent Relays, Type WL Auxiliary Relay, Type SRA Voltage Regulator.

Contact: L. F. Mayfield, Room 534 Adams Building, Phillips Petroleum Company, Bartlesville, Oklahoma.

ELECTRICAL WIRE AND CABLE

—YOUR BEST SOURCE—

- for every industrial and power application
- Odd lengths—long and short—reasonably priced

One of the Largest Stocks in the Midwest

Let us quote on requirements—
send your inquiries
We'll also buy your Surplus

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FOR YOUR TEMPORARY NEEDS TRY OUR SURPLUS DIVISION

UNIVERSAL Wire and Cable Co.

2664M N. Clybourn Ave., Chicago 14, Ill.
EAstgate 7-4777 Code: UNIWIRE

MOTORS · GENERATORS TRANSFORMERS

NEW · REBUILT

WORLD'S LARGEST INVENTORY

ELECTRIC EQUIPMENT CO.

PHONE STATION COLLECT GL 6781
P.O. BOX 31 ROCHESTER 1, NEW YORK

PERIODICALS

A.I.E.E. transactions back-volume wanted to buy for cash. Ashley, 27 E. 21, N.Y.C. (10).

If there is anything you want
that other readers can supply
OR . . . something you don't want—
that other readers can use—
Advertise it in the
SEARCHLIGHT SECTION

TRANSFORMERS

FOR SALE

3—1000 KVA Mol. 11500-2400/4160Y
3— 500 KVA W-H 33000-2300/2400
3— 500 KVA G-E 22000-2300/4000Y
5— 333 KVA W-H 38000-7200/12470Y
3— 333 KVA A-Ch 13800-240/480
3— 333 KVA Wag 6900/11950Y-7200/12470Y
3— 333 KVA G-E 7200/12470Y-2400/4160Y
3— 250 KVA G-E 2415/2300-600
6— 200 KVA G-E 13200-2400/2300
6— 200 KVA G-E 13200-230/460
1—1500 KVA W-H 34500-2400/4160Y
3-ph., with substation equip't

Many other items in stock

TRANSFORMERS WANTED

Reliable rewind and repair service on all makes of transformers

THE ELECTRIC SERVICE CO.

5316 Hetzel St.
Cincinnati 27, Ohio

40 Years' Dependable Service

CORNELL UNIVERSITY

Has for disposal by sealed bids to be opened February 1, 1956 at Purchasing Department, Ithaca, N. Y.

12 Diesel Engines from 25-1700 H.P.

5 Diesel Generators

2 Cummins equipped with AC Generators 450V 3ph 96.2 Amp., D.C. Generator 120 V 167 Amp.

2 General Motors with DC Generators 120 V 167 Amp.

1 Buda DC Generator 250V 60KW.

1 1500 H.P. Taylor Hydraulic Dynamometer 3100 RPM.

Further information and specifications available on request

MR. W. ROGERS
Purchasing Department
Cornell University
Ithaca, N. Y.

SUBSTATION EQUIPMENT

TRANSFORMERS

QU.	KVA	MFR.	VOLTAGE
3	1000	Mol.	110,000—460
1	3750	West.	69000—14400, 3 ph.
4	2500	Mol.	66000—13800
4	750	G.E.	66000/114000—13200
4	500	West.	66000—6900
3	200	Pitts.	66000—2300
3	1500	Wag.	44000—6900/11950
3	1250	A.C.	44000/11500—460
3	200	West.	44000—480
3	75	West.	44000—7200/12470Y
1	7500	A.C.	39838/69000Y—13200, 3 ph.
3	5000	G.E.	38100/66000—6600
1	3750	Penna.	38030/65865Y—13800, 3 ph.
4	3333	G.E.	38100/66000Y—33000
4	3125	Mol.	39900/66000Y—26600/46000Y
3	3333	G.E.	33000/11000—2400/7200
1	3000	G.E.	33000—6900/2300, 3 ph.
2	3000	Stand.	33000—4160, 3 ph.
1	2500	A.C.	34500—13800, 3 ph.
1	2000	Kuhl.	33000—6900, 3 ph.
3	667	A.C.	33000—2400/4160 Y
3	200	A.C.	34500—2400/7200/12470Y
3	200	G.E.	34500—120/240
3	75	Wag.	33000—240/480
3	3750	G.E.	26400—4360/2520, 3 ph.
3	2000	G.E.	26400/13200—2400
3	1250	G.E.	26400/13200—2400
3	400	G.E.	26400—2400
4	1500	A.C.	25400/44000Y—6900/13800
3	333	G.E.	22800/13200—2400
3	100	G.E.	22000—7200/12470Y
1	1000	West.	13200—2300, 3 ph. Unit Sub.
1	600	Stand.	13200—2300, 3 ph.
1	450	Penna.	13200—2400, 3 ph. ASKAREL
3	200	G.E.	13200—2400
3	125	A.C.	6900—2300
3	37½	G.E.	6900—230/460
3	50	G.E.	4800/2400—240/480
3	333	G.E.	2400/4160Y—460
3	250	G.E.	2300/4000Y—115/230
3	200	West.	2400—240/480
3	150	West.	2400—230/115
1	100	G.E.	2300—575, 3 ph.
6	50	West.	2400—114/228, Dry Type

ALSO:—FREQUENCY CHANGERS
MOTOR GENERATOR SETS
SYN. CONDENSERS
OIL CIRCUIT BREAKERS
FEEDER REGULATORS, ETC.

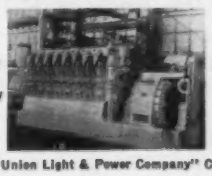
BREW, WOLTMAN & CO., INC.

52 Church St. New York 7, N. Y.

DIESEL ELECTRIC POWER

Stationary—Portable—Mobile

100 KW to 1500 KW



Engineered Diesel Power

"Union Light & Power Company" Cuba.

A. G. SCHOONMAKER COMPANY, INC.

Box 810, Sausalito, Cal. — 50 Church St., New York 7, N. Y.

Save Money — Save Time

Contact us for prices, on large power equipment of all kinds. Prompt shipment from inventory. Send for our complete catalog.

BELYEA COMPANY INC.

51 Howell St. Jersey City, N. J.

Federal Vs Local Hydro Issue Aired

. . . as special House subcommittee headed by Rep Robert Jones meets in three cities to consider Hoover task force proposal

Conflicting views on federal vs local hydro developments and the inclusion in government power rates of an amount based on federal taxes paid by private utilities in the Hoover Commission proposal high-lighted testimony before the Robert Jones (D-Ala.) special House subcommittee on water resources and power recently. Meetings were held in Portland, Los Angeles, and Denver.

Strongest criticism of the Hoover proposals was triggered by Sen Wayne L. Morse (D-Ore.) who branded the report "a studied effort to supply the power companies with a respectable and authoritative restatement of their own propaganda." He questioned objectivity of engineers hired by the commission, asserted they had ignored what he called a greater problem of water supply while recommending policies reflecting "the fondest day dreams of the power companies."

Federal Capital Fund Proposed

Later Morse argued for a federal capital fund which would remove U. S. projects repaid from revenues from the national budget and separate capital investments paying interest from operating expenses.

A theory that privately operated hydro plants on the main stem of the Columbia River might serve as "yardsticks" against efficiency of U. S. plants was offered by Ernest R. Fatland, Condon, Ore., Republican and ex-Oregon state senator from Wheatland County near the John Day site on the river.

John Day Financing Outlined

He detailed the offer of a group of investor-owned utilities to finance the $275-million powerhouse phase of the $350-million project. The ex-legislator argued the governmental economy recommendations of Hoover's report were vital to avoid disaster.

William S. Peterson of the Los Angeles Department of Water & Power said that the Hoover report indicated that an amount based on federal taxes paid by private utilities included in government power rates would mean doubling the rates at Hoover Dam.

"This would upset the economics of power supply to our community," Peterson said, "and would break faith with the long-term conditions we had a right to expect would be continued when heavy expenditures were made by us for transmission lines and long-term commitments made for the purchase of power."

He contended Hoover Dam rates "would no longer be reasonable and the return to the government would be exorbitant if an unnecessary and unwarranted tax component were to be included in the rate structure there."

Denies Plan Would Double Rates

Julian Hinds, a member of the Hoover task force and former chief engineer of southern California's Metropolitan Water District, denied to the committee that the recommendation would mean a doubling of Hoover Dam rates.

Hinds said that according to his interpretation, the recommendation would not "be retroactive to impair long-established contracts for projects already completed. It would have no influence whatever on the rates charged for Hoover Dam power. . . ."

PP&L Clarifies Utility Attitude

Pacific Power & Light Co's Attorney Allan Smith told the subcommittee the position of the investor-owned utilities regarding federal development of the Columbia River has been warped by partisans of public power. He declared that the Pacific Northwest utilities had welcomed construction of Grand Coulee and Bonneville dams.

"In 1933 President Roosevelt was given authority to spend $2 billion as he might see fit to provide employment to our then idle workers. He selected Bonneville and Grand Coulee as projects, construction of which would contribute to the alleviation of that problem. . . ."

"At that time the president of Pacific P&L issued a public statement in which he welcomed the decision to construct the plants, expressed confidence in the ultimate need for the power output, and pledged the company to pass on to its customers any savings that might accrue from the purchase of power from those projects when completed. He was joined in that pledge by the presidents of other utilities in the area. . . ."

Smith declared further, respecting partnership proposals: "We submit that to get this job done will require the effort and tax the resources of every agency involved, public, private, and governmental. It should be a mutual undertaking and recognize the effort needed to meet the power requirements of the area."

Hoover Unit Scored in Denver

Protests against the Hoover Commission task force recommendations on water and power resources were registered in Denver where the House subcommittee also staged an investigation.

Thomas G. Bonar, president of the Union Rural Electric Association, Inc, which serves an area about 18 mi northwest of Denver, scored the task force report as "a direct intent to destroy rural electrics by doing away with cooperatives and preference customers."

In a written statement submitted for the subcommittee's records, Bonar said the Hoover unit's report infers that cooperatives are socialistic "but says nothing about the subsidy private utilities are enjoying in rapid tax writeoffs." He claimed the tax-writeoff program nets private electric companies about $979 million in interest-free loans and an additional $3.3 million in "subsidy" over a period of 33⅓ years.

Mills Bunger of Wheat Ridge, Colo., a retired Bureau of Reclamation engineer, said the Hoover proposals would end reclamation in the west. The suggested changes in reclamation laws and procedures would not only prevent construction of federally owned power plants but also would require the government to sell existing plants to private interests.

Rep Wayne Aspinall (D-Colo.) also denounced the Hoover Report and said the Colorado River Storage Project pending before Congress would "wither and die" if the government adopts the recommendations.

Ward Bannister, Denver lawyer, replied that he had the personal word of Mr Hoover that the task force did not oppose Colorado River project.

Kvar, Kvac, Kval, Ckva, or What's Your Choice?

Let's not Confound Confusion

To the Editor:

Referring to the Technical Note suggestion (EW, Oct. 17, p 258) on abbreviations for reactance loads, why not designate lagging load simply as kvar and capacitive kva as ckva?

R. C. Hunt
Associate Engineer

Virginia Electric & Power Co
Richmond, Va.

• Reader Hunt refers to the suggestion that inductive kva be designated as kval and capacitive kva be kvac. Reason for adding the letters to kva is to differentiate definitely between the two reactance loads by using known symbols, L for in inductance and C for capacitance. Moreover, both suggested terms can be pronounced as two-syllable words, k'vals and k'vacs similar to k'vars.

A few engineers believe that retaining kvar for signifying inductive load, if a standard is established, might be confusing for a while because kvar has referred to both types of reactive load for many years.

What do you think of kval and kvac? Any other suggestions?

Vepco Engineer Favors Kvar and Ckva

To the Editor:

The suggestion contained in Technical Notes, page 258, Oct. 17, that kvar nomenclature be "simplified" by designating lagging-load kvar as "kval" and "capacitative" (sic) kvar as "kvac" seems to have drawn no comment from readers. Lest this silence be taken for tacit consent, I venture to register strong objection on the ground that it will simplify nothing but, on the contrary, will make confusion worse confounded.

Electrical people have been wrestling with this problem for years. ASA Definitions of Electrical Terms (ASA-C42-1941) says that reactive power may be positive or negative, with positive reactive power being that which is supplied to a capacitive circuit and called "capacitive reactive power," the other kind being called "inductive reactive power." Note the words "supplied to," which indicate that direction of flow is also a necessary part of a description of reactive power. Two different kinds of reactive power, distinguished by two different pairs of adjectives, combined with two possible directions of flow, provide all the conditions for complete confusion.

Utility people found it impractical to accept the convention on positive and negative signs, and a subcommittee of the AIEE Standards Committee, recommended reversal of the sign. In accordance with this change, reactive power flowing from a shunt capacitor is positive. It is believed that the forthcoming revision of ASA-C42 will incorporate this change.

This new convention on sign of reactive power still does not dispose of the confusion resulting from attempts to differentiate two kinds of reactive power, as by the words capacitive and inductive, leading and lagging, positive and negative. The words or signs "plus" and "minus" have been used in some cases to indicate direction of flow which can be confused with the concept of positive (or negative) reactive power.

These confusions can be resolved by considering only one kind of reactive power (the kind now defined as positive, of course) and describing its direction of flow by terms other than plus or minus. Thus we may say that reactive power flows from one specified point toward another; eg, from a shunt capacitor to the bus, or from the bus to an induction motor.

The concept of just one kind of reactive power, having a describable direction of flow, clears away much past confusion. Kilovar is the name of a multiple unit (= 1,000 vars), and its abbreviation is "kvar." Let's leave it at that.

C. K. Duff
Senior Technical Engineer
System Planning Department
The Hydro-Electric Power Commission of Ontario
Toronto 2, Canada

• We will welcome any additional comment.

Street Lighting Needs More Support

To the Editor:

Thanks very much for the excellent play that you gave to the Connecticut Light & Power Co's promotional program in your Oct. 3 issue. I have received many complimentary remarks for the company from people in Connecticut.

As you know, street lighting is one of the slowest and most frustrating things to sell in the selling world. It takes a minimum of a year before results are apparent; and even then if you can see 50% results, the return is excellent.

I wish that more magazines like "Electrical World" would help us in this extremely important educational program. For those of us in the business there is no doubt that night-time illumination has a very real effect on our lives both from a protective as well as a financial aspect. You have started a trend which I hope other magazines will copy. I am convinced that it is this type of coverage that is needed to help all of the responsible people make up their minds to light adequately their towns' streets.

Many thanks to "Electrical World." I hope that you make this an annual report. It will stimulate interest nationwide as it already has in Connecticut.

R. E. Ballard
Street Lighting Engineer

Connecticut Light & Power Co.
Berlin, Conn.

WASHINGTON COMMENT

Democrats Want Tighter Preference

They believe they have an issue with political appeal and are now ready to push it. Kefauver, Chudoff, O'Mahoney hearings will be basis for campaign

Democrats talk now of launching an all-out, pre-election offensive to bolster the preference laws. The battle may give the biggest test yet to the Eisenhower Administration's plan to encourage local-federal development of the nation's power resources.

Led by House Democrats Robert Jones (Ala.) and Earl Chudoff (Pa.) and Senate Democrats Estes Kefauver (Tenn.) and Joseph C. O'Mahoney (Wyo.), federal power forces in Congress spent many weary months in 1955 laying the groundwork for new power marketing legislation. They charged that hair-line violations of the preference laws had been attempted. Their scheme is to move early this year to make preference absolute.

Democrats contend the Flood Control Act of 1944 and subsequent court decisions make it mandatory to extend a permanent offer of all available federal power to preference customers including cooperatives, municipalities, and public utility districts. They believe all federal power should be held available for use whenever preference customers' systems need it.

Is "Preference" Forever?

Republicans fought this position in the beginning. And the Eisenhower Administration has tried to apply the clause more flexibly. Preference should be extended to co-ops and public agencies when power from a federal project is first produced, they believe. But they also believe that, with reasonable allowances for preference customers' growth, the remainder of such power should be made available to other nearby utilities.

In presenting its case to hostile committees last session, the Administration's plea for a "rule of reason" fell on deaf ears. Interior Department officials responsible for marketing of power from federal projects tried in vain to put over their view that priority in disposal of federal power to public agencies should not be guaranteed forever, regardless of conditions. Assistant Secretary of Interior Fred G. Aandahl carried most of the load in trying to convince Congress that a reasonable time limit should be placed on offers of power. Attorney General Herbert Brownell, who ruled that first-offer preference on busbar sales must be extended to public agencies, suggested this same approach.

Can't Please the Crusaders

Both failed to satisfy the federal power crusaders. Their argument that granting to a public agency the perpetual right to purchase federal power is an unreasonable application of the law went unheeded by vote-hungry Democrats who were already laying plans for their new legislation.

This attitude was apparent at the outset. Chudoff held hearings in a half-dozen major cities without inviting Administration officials to give their side of the story until the final session in Washington. By then he had collected a filing cabinet full of ammunition with which to harass official witnesses.

The plan is to define preference laws more precisely, restricting Interior's discretion in marketing federal power.

During the fight, if it comes, the Administration's partnership policy will be at stake. If the Democrats put over their plans, local development of the power features of federal multi-purpose projects could be crippled for some time to come.

TECHNICAL NOTES

Proponents of dc transmission hope for direct conversion of atomic energy to electricty—dc, of course.

Use of aluminum channels for crossarms and aluminum angles for K-bracing on wood H-frames is now in its tenth year on a BPA 230-kv line.

Better means of blowing out new steam lines or a better strainer would probably reduce the turbine troubles caused by pipe-line debris.

Building-supported stacks of riveted steel lined with brick display more damping of wind-excited vibration than do self-supported welded stacks lined with gunite.

Emphasis on lightning protection of chemical-plant electrical equipment has shifted to elimination of process shutdown which can be much more costly than repair of damaged electrical equipment.

Ultimate motivation for dc transmission may be to overcome limitations of ac charging current in long cables.

Aluminum-alloy fabricated components for a transmission tower or substation structure cost about twice as much as galvanized steel counterparts but weigh half as much.

Increasing system complexity imposes greater reliability requirements upon each component in order that the whole may meet service continuity objectives.

Driving of aluminum rivets for tower and substation structures is facilitated by using a flat cone-type head because it is easier to form than a standard button head.

Money Market Outlook on Utilities

- **Prompt marketing of senior securities suggested for "new money" needs**
- **Steady trend noted toward higher rates for short term and bond money**

Electric utilities needing funds within six months would make no mistake in proceeding to market senior securities promptly. As to common stock equity money, the period can be stretched to a year. These recommendations were made in this column (EW, Oct. 31, p 146). They still hold true today. Recent developments in the long term and equity money markets seem to confirm these recommendations.

After a relative standstill in bond yields on electric utility securities for some time back, this item has taken a rather drastic rise in the last few weeks. As this is being written New Jersey Bell Telephone Co 3⅜% debentures due 1995 (carrying a Moody's Investors Service top rating of Aaa) are being offered on a 3.33% basis. This is considerably more than the highest rated type of utility security fetched a month or two previous.

Securities Hard to Market

Syndicates have found it difficult to distribute their commitments at original offering prices. In some cases the syndicates have dropped the offering price or disbanded with many bonds still to be sold.

Another straw in the higher interest rate wind which has prevailed recently is Wall Street Journal's table of 13 new utility offerings of bonds dated Dec. 15. It shows average bids about 1.3% of principal below original average offering prices, indicating an increased yield on these obligations of .06% per annum. If one issue (offered some time ago when prices were better) is eliminated from the average, these figures would become 1.6% and .08% per annum, respectively. This is in contrast to the .035% per annum lowering of utility bond yields on new offerings based on Wall Street Journal bids as of Oct. 11, as compared with original offering yields.

The trend in the short term money markets in the last few months has been steadily toward higher rates. U. S. Treasury bills have risen to over 2.5% on the 91-day variety. Interest rates on prime commercial bank loans and the rediscount rate have both been raised to levels not seen for many years. Numerous varieties of short term paper have kept pace with this procession, and the end does not seem in sight.

By usual custom there is a firming of bond prices immediately after the turn of the year, due to increased investment demand. This time the New Year will find the Ford stock offering (EW, Dec. 26, p 142 and Jan. 2, p 9) a potent factor, which may have an effect on electric utility bond yields, as well as on the price levels of electric utility common stocks. Investors may liquidate holdings of securities now owned in order to have funds available for subscriptions to the Ford Motor Co stock offering.

A period of underlying strength may follow completion of the Ford offering, reflecting reinvestment demand both of the Ford Foundation, and of other investors by reason of cutbacks in allotments in their Ford subscriptions. Thus the period following the Ford deal may prove a favorable one for electric utilities to market their security needs. How long this factor of strength may continue is anybody's guess, but two to six months might not prove a bad prediction.

We may find Federal government policy turning toward easier money rates as the presidential election approaches. This is most likely to occur if business should show any signs of falling back from the high levels recently achieved. The possibility of easier money rates from this cause, somewhere during the next six to nine months, may create mild optimism as to the trend of long-term money costs over that period. But this is hardly enough to warrant electric utilities holding back from offering needed financing.

If a chart line were to be drawn, delineating the trend of long term interest rates (and cost of other senior securities) after the New Year begins, and using bond prices rather than interest yields as the criterion, it might show a modest rise in the earliest days of January, followed by some sloughing off as the Ford offering date approaches.

After completion of the Ford deal, it wouldn't be surprising if this line pointed upward for a time and then flattened out on a decently high plateau. From there on, movements of business activity and the vicissitudes of election year politics could well jiggle the see-saw up or down.

Raise Senior Money Now

Does the "net" of all this add up to a "green" or a "red" light for offerings now on the horizon, where the money can be efficiently used by electric utilities in the near future? We think the favored color still remains "green." We don't believe electric utilities will be making too serious a mistake in proceeding to raise senior money as needed in the near future.

The above conclusion is even more applicable to common stock equity money, because price-earnings ratios and dividend yields on electric utility stocks are generally so favorable to the companies as to intensify the "green" light for this type of offering. So favorable seem these current price levels that they indicate the advisability of raising equity money up to one year.

Higher rates on U. S. Treasury bills for temporary investment (currently over 2.50%) will lessen the loss of money from such accelerated sales of common stock. It is possible that electric utility equity yields may drop even lower, but considering prevailing levels the betting should be on the side of a "do-it-now" policy.

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Advertising in This Issue

Allen-Bradley Co. 45
Allis-Chalmers Mfg. Co.....4th Cover
10, 11, 103, 104, 105, 106, 128

Baxter & Co., J. H..... 36
Bell Telephone Laboratories..... 141
Bethlehem Steel Co..... 154
Brown Co. 121
Buffalo Forge Co..... 119

Cavalier Corp. 113
Chance Co., A. B. 111
Continental Wire Corp..... 123

Delta-Star Electric Division
H. K. Porter Company, Inc.... 115
Directory of Engineers..... 152
du Pont de Nemours & Co., (Inc.)
Polychemicals Dept. 99

Engineers, Directory of..... 152
Everstick Anchor Co..... 126
Exide Industrial Div., The Electric
Storage Battery Co.....3rd Cover

Fisher-Pierce Co., Inc..... 145

General Electric Co.
Apparatus Dept. 88, 89
90, 91, 93, 94, 95, 126
Construction Materials Div...42, 43
Gould-National Batteries, Inc..... 97
Graybar Electric Co., Inc..... 5
Grinnell Co., Inc..... 7
Grip-Tite Mfg. Co..... 128
Gulf Oil Corp..... 40

Hazard Insulated Wire Works... 4
Holan Corp., J. H..... 13
Homelite Corp. 131
Hubbard & Co..... 117
Husky Products, Inc..... 122

I-T-E Circuit Breaker Co.,
Switchgear Div. 17
Indiana Steel & Wire Co., Inc.... 153
International Harvester Co..... 35

Jenkins Bros. 48
Johns-Manville 137

Kearney Corp., James R..... 38
Kennecott Copper Corp.....28, 29
Kerite Co., The..... 50
Kidde & Co., Inc., Walter..... 129
Kim Hotstart Mfg. Co..... 145
Kuhlman Electric Co.....46, 47

Lapp Insulator Co., Inc..... 37
Leach Corp., Inet-Palmer Div..... 9
Line Material Co... 23, 24, 25, 26, 27

Malleable Iron Fittings Co..... 127
Meter Devices Co..... 153
Minerallac Electric Co..... 132
Minneapolis-Honeywell Regulator
Co., Industrial Div.....134, 135
Moloney Electric Co.....14, 15

National Electric Mfr's Ass'n,
Commercial Cooking Equipment
Section 133
National Telephone Supply Co... 44

Ohio Brass Co.....100, 101
Okonite Co., The..... 4

Pennsylvania Transformer Co.... 18
Pieper-Lillard, Inc. 144
Pritchard & Co., J. F..... 124, 125

Rockbestos Products Corp..... 139
Royal Electric Mfg. Co..... 120
Ryerson & Son, Inc., Joseph T... 132

Sangamo Electric Co..... 30
Searchlight Section 146, 147
Simplex Wire & Cable Co..... 12
Southern States Equipment Corp. 8
Standard Oil Co., (Indiana)..... 109
Standard Transformer Co..... 39

Texas Co., The.....2nd Cover
Thomas & Betts Co., The..... 41
Triangle Conduit & Cable Co., Inc. 16

United States Rubber Co..... 6
Uptegraff Mfg. Co., R. E..... 49

Western Precipitation Corp..... 143

■

PROFESSIONAL SERVICE 152

■

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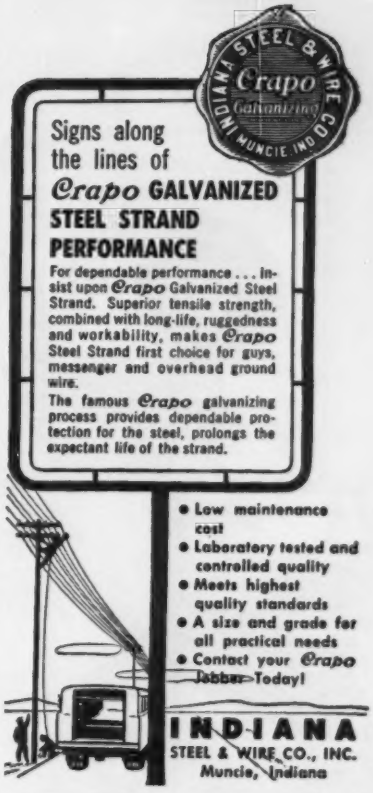
F. J. Eberle, Ass't. Mgr.

EMPLOYMENT OPPORTUNITIES..... 146

EQUIPMENT
(Used or Surplus New)
For Sale 147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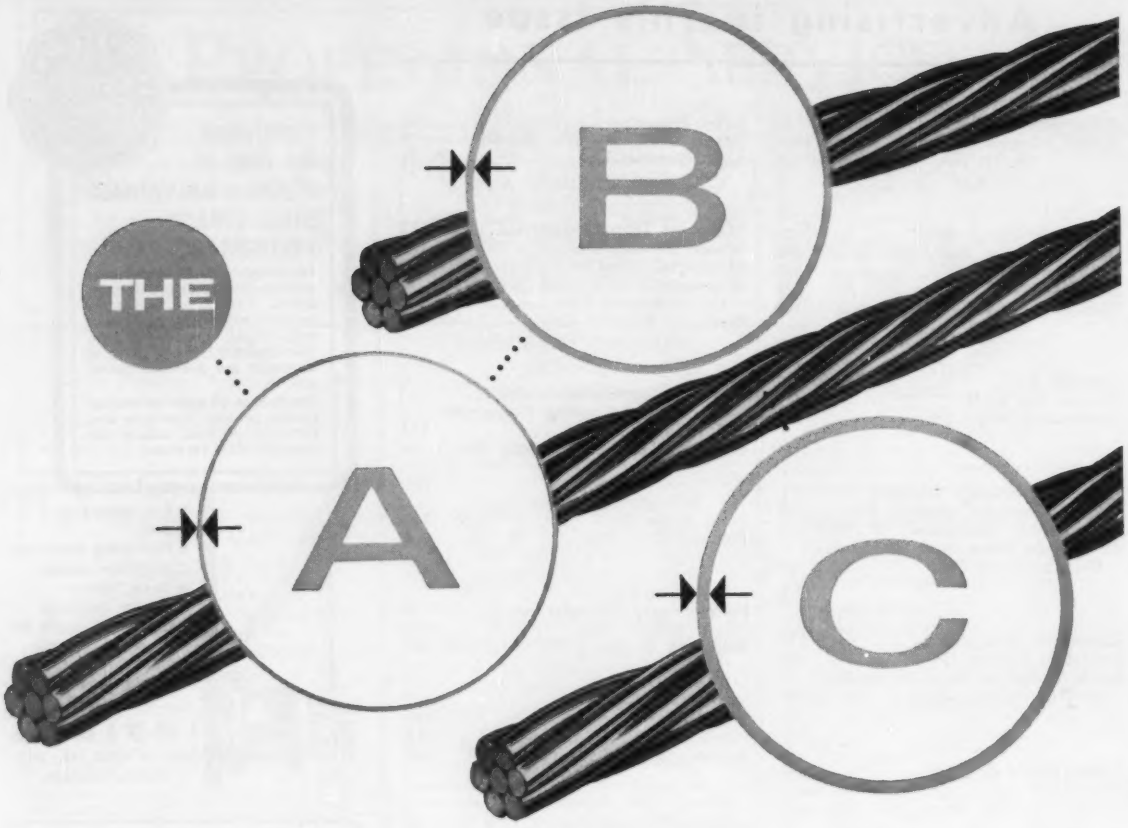

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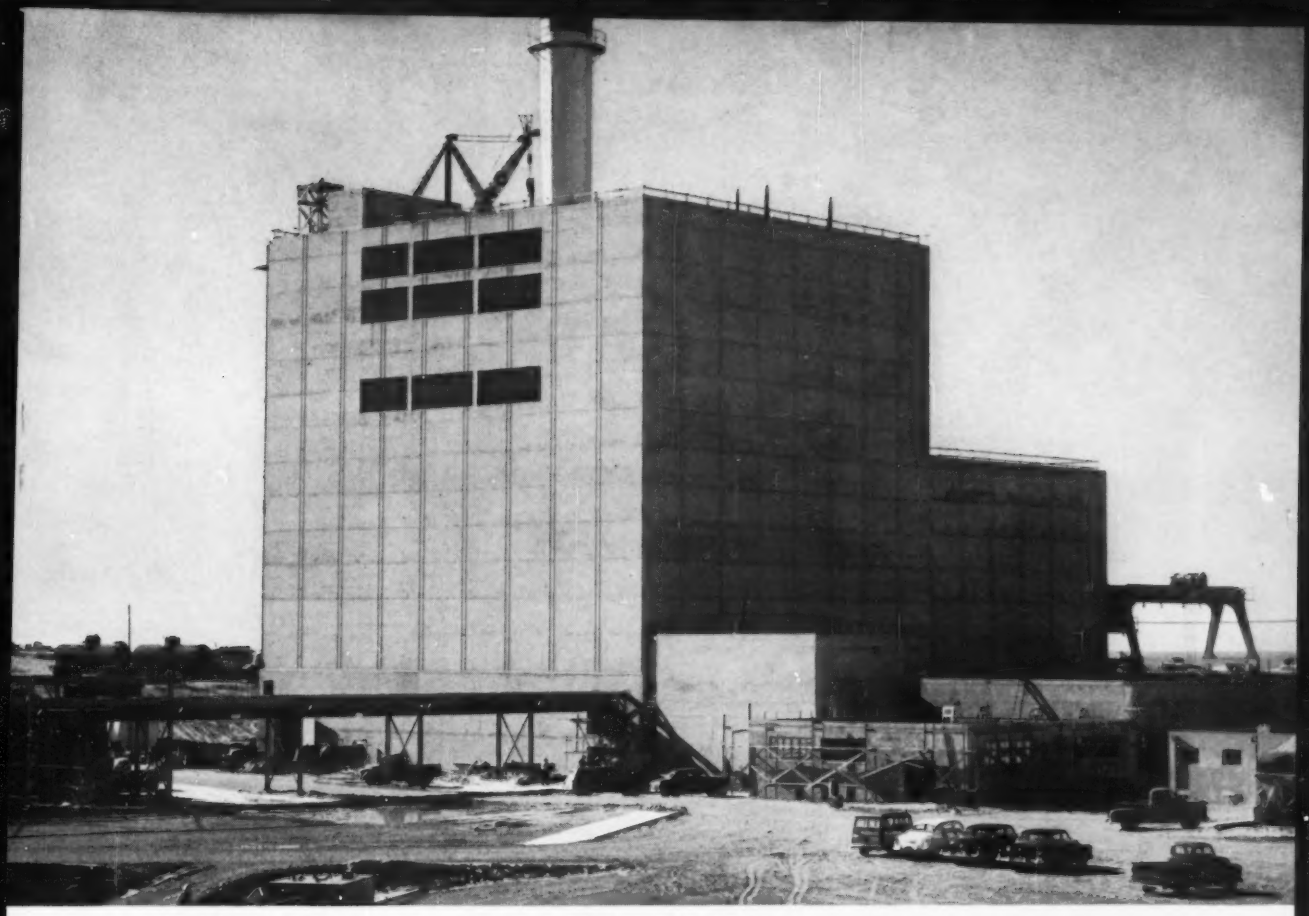

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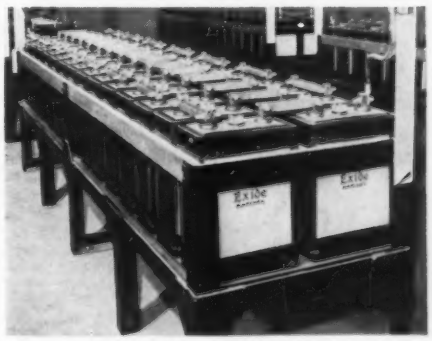

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shows that every Allis-Chalmers distribution transformer is impulse tested.

Do Your Distribution Transformers Have This *Proof* of Quality?

REGARDLESS of size or voltage, every Allis-Chalmers distribution transformer brings you proof of insulation quality. The "impulse tested" seal on every unit shows that impulse tests were made during production with the most modern impulse testing equipment available to the industry.

Eight years ago Allis-Chalmers initiated impulse testing for pole-type units. Now, every unit through 500 kva, 69 kv and below, gets this positive check to assure that its insulation can withstand severe lightning and surge conditions. No lightning arrester is used. Allis-Chalmers tests the transformer, not the lightning arrester.

Get the facts on this and other A-C production line tests that result in distribution transformers of the highest quality. Call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-4877

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